



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**NOTICE TO BIDDERS
AND
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN RIVERSIDE COUNTY NEAR
HEMET FROM 0.6 MILE EAST OF ROUTE 215 TO 0.4 MILE WEST OF ACACIA
AVENUE.**

In District 08 On Route 74

Under

Bid book dated December 10, 2018

Standard Specifications dated 2018

Project plans approved June 29, 2018

Standard Plans dated 2018

Identified by

Contract No. 08-0N6704

08-Riv-74-28.1/37.4

Project ID 0800000536

Federal-Aid Project

ACHSNH-P074(067)E

SPECIAL NOTICES

- See sections 2 and 3 for contractors' registration requirements.
- See section 2 for submittal requirements for DBE quotes, DVBE quotes, and Non–Small Business Subcontractor Preference.
- The schedules for the submittal of DBE forms have been revised. See section 2-1.33 for the submittal schedules.
- See section 2-1.04 for mandatory prebid meeting requirements.

CONTRACT NO. 08-0N6704

The special provisions contained herein
have been prepared by or under the
direction of the following Registered
Person.

HIGHWAYS

 6/14/18
REGISTERED CIVIL ENGINEER



TRAFFIC


REGISTERED CIVIL ENGINEER



ELECTRICAL


REGISTERED ELECTRICAL ENGINEER

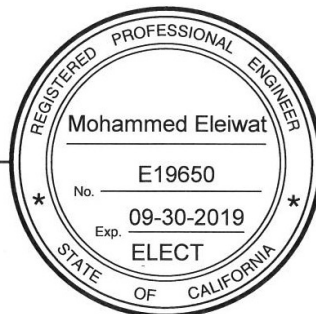


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STANDARD PLANS LIST

The standard plan sheets applicable to this Contract include those listed below. The applicable revised standard plans (RSPs) listed below are included in the project plans.

A3A	Abbreviations (Sheet 1 of 3)
A3B	Abbreviations (Sheet 2 of 3)
A3C	Abbreviations (Sheet 3 of 3)
A10A	Legend - Lines and Symbols (Sheet 1 of 5)
A10B	Legend - Lines and Symbols (Sheet 2 of 5)
A10C	Legend - Lines and Symbols (Sheet 3 of 5)
A10D	Legend - Lines and Symbols (Sheet 4 of 5)
A10E	Legend - Lines and Symbols (Sheet 5 of 5)
A20A	Pavement Markers and Traffic Lines - Typical Details
A20B	Pavement Markers and Traffic Lines - Typical Details
RSP A20C	Pavement Markers and Traffic Lines - Typical Details
RSP A20D	Pavement Markers and Traffic Lines - Typical Details
A24A	Pavement Markings - Arrows
A24B	Pavement Markings - Arrows and Symbols
A24C	Pavement Markings - Symbols and Numerals
A24D	Pavement Markings - Words
RSP A24E	Pavement Markings - Words
A24F	Pavement Markings - Crosswalks
RSP A24G	Pavement Markings - Yield Lines, Limit Lines, and Wrong Way Details
A62A	Excavation and Backfill - Miscellaneous Details
A73A	Object Markers
RSP A73B	Markers
A73C	Delineators, Channelizers and Barricades
A74	Survey Monuments
A76A	Concrete Barrier Type 60M
A76B	Concrete Barrier Type 60M
A77L1	Midwest Guardrail System - Standard Railing Section (Wood Post with Wood Block)
A77M1	Midwest Guardrail System - Standard Hardware
A77N1	Midwest Guardrail System - Wood Post and Wood Block Details
RSP A77N3	Midwest Guardrail System - Typical Line Post Embedment and Hinge Point Offset Details

A77N4	Midwest Guardrail System - Typical Railing Delineation and Dike Positioning Details
A77P1	Midwest Guardrail System - Typical Layouts for Embankments
A77P2	Midwest Guardrail System - Typical Layouts for Embankments
A77P3	Midwest Guardrail System - Typical Layouts for Embankments
A77P4	Midwest Guardrail System - Typical Layouts for Embankments
A77P5	Midwest Guardrail System - Typical Layouts for Embankments
A77P6	Midwest Guardrail System - Typical Layouts for Embankments
A77R3	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
A77R4	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
A77R5	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
A77R6	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
A77R7	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
A77R8	Midwest Guardrail System - Typical Layouts for Roadside Fixed Objects
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A77U3	Midwest Guardrail System - Connections to Abutments and Walls
A77U4	Midwest Guardrail System - Transition Railing (Type WB-31)
RSP A85	Chain Link Fence
A85A	Chain Link Fence Details
A85B	Chain Link Fence Details
A87A	Curbs and Driveways
A87B	Hot Mix Asphalt Dikes
A88A	Curb Ramp Details
A88B	Curb Ramp and Island Passageway Details
P74	Pavement Edge Treatments
P75	Pavement Edge Treatments - Overlays
P76	Pavement Edge Treatments - New Construction
D71	Drainage Inlet Markers
D72B	CIP Drainage Inlets - Types G1, G2, G3, G4, G5 and G6
D72C	CIP Drainage Inlets - Types G1, G2, G3, G4, G5 and G6
D74	Drainage Inlet Details
D75B	Concrete Pipe Inlets
D75C	Pipe Inlets - Ladder and Trash Rack Details
D77A	Grate Details No. 1
D77B	Grate Details No. 2

D78A	Gutter Depressions
D78C	Inlet Depressions - Hot Mix Asphalt Shoulders
D80	Cast-In-Place Reinforced Concrete Single Box Culvert
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RSP D82	Cast-In-Place Reinforced Concrete Box Culvert - Miscellaneous Details
RSP D84	Box Culvert Wingwalls - Types A, B and C
D87D	Overside Drains
D89	Pipe Culvert Headwalls - Straight and "L"
D94A	Metal and Plastic Flared End Sections
D94B	Concrete Flared End Sections
H1	Landscape and Erosion Control Symbols
H2	Landscape Details
H3	Landscape Details
H4	Landscape Details (Riser Sprinkler Assembly)
H5	Landscape Details (Swing Joint and Protector)
H6	Landscape Details
H8	Landscape Details
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T1B	Temporary Crash Cushion, Sand Filled (Bidirectional)
T2	Temporary Crash Cushion, Sand Filled (Shoulder Installations)
T3A	Temporary Railing (Type K)
T3B	Temporary Railing (Type K)
T9	Traffic Control System Tables for Lane and Ramp Closures
T10	Traffic Control System for Lane Closure on Freeways and Expressways
T10A	Traffic Control System for Lane Closure on Freeways and Expressways
T11	Traffic Control System for Lane Closure on Multilane Conventional Highways
T11A	Traffic Control System for Changeable Lane Closure on Multilane Conventional Highways and Expressways
T12	Traffic Control System for Half Road Closure on Multilane Conventional Highways and Expressways
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T33	Temporary Pedestrian Access Routes - Ramp

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RS2	Roadside Signs - Wood Post - Typical Installation Details No. 2
RS4	Roadside Signs - Typical Installation Details No. 4
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S93	Framing Details for Framed Single Sheet Aluminum Signs, Rectangular Shape
S94	Roadside Framed Single Sheet Aluminum Signs, Rectangular Shape
S95	Roadside Single Sheet Aluminum Signs, Diamond Shape
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RSP ES-1B	Electrical Systems (Legend)
RSP ES-1C	Electrical Systems (Legend)
RSP ES-2A	Electrical Systems (Service Equipment)
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RSP ES-3C	Electrical Systems (Controller Cabinet Foundation and Pad Details)
RSP ES-3I	Electrical Systems (Electronics Assembly Connection Diagram, with Bypass Control Line)
RSP ES-4A	Electrical Systems (Signal Head Mounting)
RSP ES-4B	Electrical Systems (Pedestrian Signal Heads)
ES-4C	Electrical Systems (Signal Heads and Mountings)
RSP ES-4D	Electrical Systems (Signal Head Mounting)
RSP ES-4E	Electrical Systems (Signal Heads and Optical Detector Mounting)
ES-5A	Electrical Systems (Loop Detectors)
RSP ES-5B	Electrical Systems (Detectors)
ES-5C	Electrical Systems (Accessible Pedestrian Signal and Push Button Assemblies)
RSP ES-5D	Electrical Systems (Curb and Shoulder Termination, Trench, and Handhole Details)

RSP ES-7A	Electrical Systems (Signal and Lighting Standard, Type TS, and Push Button Assembly Post)
RSP ES-7B	Electrical Systems (Signal and Lighting Standard, Type 1 and Equipment Identification Characters)
RSP ES-7C	Electrical Systems (Signal and Lighting Standard, Case 1 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 30')
ES-7E	Electrical Systems (Signal and Lighting Standard, Case 3 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 45')
ES-7F	Electrical Systems (Signal and Lighting Standard, Case 4 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 25' to 45')
ES-7G	Electrical Systems (Signal And Lighting Standard, Case 5 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 50' to 55')
RSP ES-7J	Electrical Systems (Flashing Beacon on a Type 1, Type 15-FBS and Type 40 Standard)
ES-7K	Electrical Systems (Flashing Beacon with Type 9, 9A and 9B Sign)
ES-7L	Electrical Systems (Flashing Beacon with Type 9, 9A and 9B Sign)
RSP ES-7M	Electrical Systems (Signal and Lighting Standard, Detail No. 1)
ES-7N	Electrical Systems (Signal and Lighting Standard, Detail No. 2)
RSP ES-7O	Electrical Systems (Signal and Lighting Standard, Detail No. 3)
ES-7P	Electrical Systems (Internally Illuminated Street Name Sign)
ES-7R	Electrical Systems (Signal and Lighting, Miscellaneous Attachment)
ES-8A	Electrical Systems (Non-Traffic Pull Box)
ES-8B	Electrical Systems (Traffic Pull Box)
ES-10A	Electrical Systems (Isofootcandle Curves)
ES-13A	Electrical Systems (Splice Insulation Methods Details)
RSP ES-13B	Electrical Systems (Kinking and Banding Detail)

CANCELED STANDARD PLANS LIST					
The standard plan sheets listed below are canceled and not applicable to this contract.					
Plan No.	Date Canceled	Plan No.	Date Canceled	Plan No.	Date Canceled
C7A	10-19-18				
C7B	10-19-18				
C7C	10-19-18				
B11-56	10-19-18				
B11-57	10-19-18				
ES-2C	10-19-18				

CANCELED STANDARD PLANS LIST					
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Plan No.	Date Canceled	Plan No.	Date Canceled	Plan No.	Date Canceled
C7A	10-19-18				
C7B	10-19-18				
C7C	10-19-18				
B11-56	10-19-18				
B11-57	10-19-18				
ES-2C	10-19-18				

[illegible]

NOTICE TO BIDDERS

Bids open Thursday, February 21, 2019

Dated December 10, 2018

General work description: Construct raised median and left turn lanes.

The Department will receive sealed bids for CONSTRUCTION ON STATE HIGHWAY IN RIVERSIDE COUNTY NEAR HEMET FROM 0.6 MILE EAST OF ROUTE 215 TO 0.4 MILE WEST OF ACACIA AVENUE..

District-County-Route-Post Mile: 08-Riv-74-28.1/37.4

Contract No. 08-0N6704

The Contractor must have either a Class A license or the following Class C license which constitutes a majority of the work: C-12.

The DBE Contract goal is 15 percent.

Federal-aid project no.:

ACHSNH-P074(067)E

Bids must be on a unit price basis.

Complete the work, excluding plant establishment work, within 340 working days.

Complete the work, including plant establishment work, within 465 working days.

Complete the plant establishment work within 125 working days.

The estimated cost of the project is \$24,200,000.

A mandatory prebid meeting is scheduled on January 10, 2019 at 10:00-11:00 a.m. at Basement Training Room, 464 W. 4th Street, San Bernardino, CA 94501.

The Department will receive bids until 2:00 p.m. on the bid open date via Bid Express website. Bids received after this time will not be accepted. For more information refer to the Electronic Bidding Guide at the Office Engineer's website.

The Department will open and publicly read the bids through webcast/teleconference services immediately after the specified closing time.

For bid results go to:

<http://www.dot.ca.gov/des/oe/contractor-info.html>

Select *Electronic Bidding* under the *Bidding* tab.

District office addresses are provided in the *Standard Specifications*.

Present bidders' inquiries to the Department and view the Department's responses at:

http://www.dot.ca.gov/hq/esc/oe/inquiry/bid_inquiries.php

Questions about alleged patent ambiguity of the plans, specifications, or estimate must be asked before bid opening. After bid opening, the Department does not consider these questions as bid protests.

Submit your bid with bidder's security equal to at least 10 percent of the bid.

Prevailing wages are required on this Contract. The Director of the California Department of Industrial Relations determines the general prevailing wage rates. Obtain the wage rates at the DIR website, <http://www.dir.ca.gov>, or from the Department's Labor Compliance Office of the district in which the work is located.

The federal minimum wage rates for this Contract as determined by the United States Secretary of Labor are available at <http://www.dot.ca.gov/hq/esc/oe/federal-wages>.

If the minimum wage rates as determined by the United States Secretary of Labor differs from the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors must not pay less than the higher wage rate. The Department does not accept lower State wage rates not specifically included in the federal minimum wage determinations. This includes helper, or other classifications based on hours of experience, or any other classification not appearing in the federal wage determinations. Where federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors must not pay less than the federal minimum wage rate that most closely approximates the duties of the employees in question.

The Department has made available Notices of Suspension and Proposed Debarment from the Federal Highway Administration. For a copy of the notices, go to http://www.dot.ca.gov/hq/esc/oe/contractor_info. Additional information is provided in the Excluded Parties List System at <https://www.epls.gov>.

Caltrans and the Construction Industry are committed to making partnering the way we do business. For more information, go to <http://www.dot.ca.gov/hq/construc/partnering.html>.

Department of Transportation

D08

BID ITEM LIST

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
1	070030	LEAD COMPLIANCE PLAN	LS	LUMP SUM
2	080050	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
3	090100	TIME-RELATED OVERHEAD (WDAY)	WDAY	340
4	100100	DEVELOP WATER SUPPLY	LS	LUMP SUM
5	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
6	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
7	120110	FLASHING ARROW SIGN	EA	4
8	120120	TYPE III BARRICADE	EA	50
9	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	75
10	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	18,500
11	120165	CHANNELIZER (SURFACE MOUNTED)	EA	500
12	120198	PLASTIC TRAFFIC DRUMS	EA	530
13	120300	TEMPORARY PAVEMENT MARKER	EA	240
14	036949	RETROREFLECTIVE SHEETING, TYPE XI FOR CONSTRUCTION AREA SIGN	SQFT	860
15	124000	TEMPORARY PEDESTRIAN ACCESS ROUTE	LS	LUMP SUM
16	128652	PORTABLE CHANGEABLE MESSAGE SIGN (LS)	LS	LUMP SUM
17	130100	JOB SITE MANAGEMENT	LS	LUMP SUM
18	130300	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
19	130310	RAIN EVENT ACTION PLAN	EA	40
20	130320	STORM WATER SAMPLING AND ANALYSIS DAY	EA	26

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21	130330	STORM WATER ANNUAL REPORT	EA	3
22	130560	TEMPORARY SOIL BINDER	SQYD	68,000
23	130570	TEMPORARY COVER	SQYD	1,000
24	130620	TEMPORARY DRAINAGE INLET PROTECTION	EA	190
25	130640	TEMPORARY FIBER ROLL	LF	2,500
26	130650	TEMPORARY GRAVEL BAG BERM	LF	43,700
27	130680	TEMPORARY SILT FENCE	LF	8,300
28	130900	TEMPORARY CONCRETE WASHOUT	LS	LUMP SUM
29	141103	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE (HAZARDOUS WASTE)	LF	133,000
30	141104	REMOVE YELLOW THERMOPLASTIC PAVEMENT MARKING (HAZARDOUS WASTE)	SQFT	420
31	141120	TREATED WOOD WASTE	LB	8,250
32	146002	CONTRACTOR-SUPPLIED BIOLOGIST (LS)	LS	LUMP SUM
33	153121	REMOVE CONCRETE (CY)	CY	59
34	170103	CLEARING AND GRUBBING (LS)	LS	LUMP SUM
35	180106	DUST PALLIATIVE	LS	LUMP SUM
36	190101	ROADWAY EXCAVATION	CY	30,800
37	190123	ROADWAY EXCAVATION (TOPSOIL)	CY	52
38	192502	SAND BEDDING	CY	79
39(F)	193006	STRUCTURE BACKFILL (SLURRY CEMENT)	CY	161
40(F)	193118	CONCRETE BACKFILL	CY	4

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	200114	ROCK BLANKET	SQFT	48
42	202006	SOIL AMENDMENT	CY	140
43	202037	ORGANIC FERTILIZER	LB	1,140
44	204030	TRANSPLANT TREE	EA	8
45	204035	PLANT (GROUP A)	EA	4,500
46	204036	PLANT (GROUP B)	EA	49
47	204096	MAINTAIN EXISTING PLANTED AREAS	LS	LUMP SUM
48	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
49	205035	WOOD MULCH	CY	79
50	206400	CHECK AND TEST EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
51	206402	OPERATE EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
52	208447	POP-UP SPRINKLER ASSEMBLY (GEAR DRIVEN)	EA	27
53(F)	208594	3/4" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	360
54(F)	208595	1" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	100
55(F)	208596	1 1/4" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	120
56(F)	208690	PVC PIPE CONDUIT (SLEEVE)	LF	40
57	210010	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	6
58	210121	DUFF (ACRE)	ACRE	0.1
59	210430	HYDROSEED	SQFT	290,000
60	210610	COMPOST (CY)	CY	2,960

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61	210630	INCORPORATE MATERIALS	SQFT	387,000
62	260203	CLASS 2 AGGREGATE BASE (CY)	CY	16,000
63	390100	PRIME COAT	TON	40
64	390132	HOT MIX ASPHALT (TYPE A)	TON	60,100
65	390137	RUBBERIZED HOT MIX ASPHALT (GAP GRADED)	TON	13,000
66	394075	PLACE HOT MIX ASPHALT DIKE (TYPE D)	LF	1,560
67	394090	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	SQYD	8
68	397005	TACK COAT	TON	73
69	398000	REMOVE ASPHALT CONCRETE PAVEMENT (CY)	CY	11,000
70	398200	COLD PLANE ASPHALT CONCRETE PAVEMENT	SQYD	39,800
71(F)	510090	STRUCTURAL CONCRETE, BOX CULVERT	CY	134
72(F)	510092	STRUCTURAL CONCRETE, HEADWALL	CY	47
73(F)	510094	STRUCTURAL CONCRETE, DRAINAGE INLET	CY	327
74(F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	150
75(F)	520101	BAR REINFORCING STEEL	LB	26,700
76	610103	12" ALTERNATIVE PIPE CULVERT	LF	110
77	610108	18" ALTERNATIVE PIPE CULVERT	LF	3,890
78	610112	24" ALTERNATIVE PIPE CULVERT	LF	8,270
79	610121	36" ALTERNATIVE PIPE CULVERT	LF	120
80	665022	24" CORRUGATED STEEL PIPE (.064" THICK)	LF	170

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	665031	30" CORRUGATED STEEL PIPE (.079" THICK)	LF	89
82	700617	DRAINAGE INLET MARKER	EA	22
83	705307	12" ALTERNATIVE FLARED END SECTION	EA	4
84	705315	24" ALTERNATIVE FLARED END SECTION	EA	7
85	707117	36" PRECAST CONCRETE PIPE INLET	LF	3
86	710132	REMOVE CULVERT (LF)	LF	460
87	710144	REMOVE REINFORCED CONCRETE BOX CULVERT (LF)	LF	60
88	710150	REMOVE INLET	EA	4
89	710152	REMOVE HEADWALL	EA	6
90	710212	ADJUST MANHOLE TO GRADE	EA	9
91	710214	ADJUST VALVE BOX FRAME AND COVER TO GRADE	EA	8
92	721430	CONCRETE (CHANNEL LINING)	CY	88
93	723050	ROCK SLOPE PROTECTION (1/4 T, CLASS V, METHOD B) (CY)	CY	88
94	723070	ROCK SLOPE PROTECTION (150 LB, CLASS III, METHOD B) (CY)	CY	48
95	723095	ROCK SLOPE PROTECTION (20 LB, CLASS I, METHOD B) (CY)	CY	7
96	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	38
97	730020	MINOR CONCRETE (CURB) (CY)	CY	1,650
98	730045	MINOR CONCRETE (GUTTER) (CY)	CY	220
99	730070	DETECTABLE WARNING SURFACE	SQFT	220
100	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	CY	24

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101	731504	MINOR CONCRETE (CURB AND GUTTER)	CY	1,430
102	731516	MINOR CONCRETE (DRIVEWAY)	CY	19
103	731519	MINOR CONCRETE (STAMPED CONCRETE)	SQFT	253,000
104	731521	MINOR CONCRETE (SIDEWALK)	CY	110
105	731623	MINOR CONCRETE (CURB RAMP)	CY	20
106	731760	REMOVE CONCRETE CURB AND SIDEWALK (SQYD)	SQYD	1,880
107	733000	PRE/POST CONSTRUCTION SURVEYS	EA	8
108(F)	750001	MISCELLANEOUS IRON AND STEEL	LB	53,300
109	780230	SURVEY MONUMENT (TYPE D)	EA	75
110	036950	WILDLIFE FENCE	LF	4,860
111	810120	REMOVE PAVEMENT MARKER	EA	6,600
112	810170	DELINEATOR (CLASS 1)	EA	41
113	810230	PAVEMENT MARKER (RETROREFLECTIVE)	EA	12,500
114	820141	OBJECT MARKER (TYPE K-1)	EA	60
115	820250	REMOVE ROADSIDE SIGN	EA	55
116	820610	RELOCATE ROADSIDE SIGN	EA	14
117	820750	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)	SQFT	640
118	820760	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)	SQFT	190
119	820780	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-FRAMED)	SQFT	94
120	820790	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-FRAMED)	SQFT	47

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
121	036951	RETROREFLECTIVE SHEETING, TYPE XI (FOR ROADSIDE SIGN)	SQFT	520
122	820840	ROADSIDE SIGN - ONE POST	EA	130
123	820850	ROADSIDE SIGN - TWO POST	EA	7
124	832005	MIDWEST GUARDRAIL SYSTEM	LF	1,360
125(F)	833085	PIPE HANDRAILING	LF	50
126(F)	839521	CABLE RAILING	LF	44
127	839543	TRANSITION RAILING (TYPE WB-31)	EA	3
128	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	4
129	839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	7
130	839640	CONCRETE BARRIER (TYPE 60M)	LF	300
131	839752	REMOVE GUARDRAIL	LF	300
132	840516	THERMOPLASTIC PAVEMENT MARKING (ENHANCED WET NIGHT VISIBILITY)	SQFT	9,830
133	846007	6" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	267,000
134	846009	8" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	25,200
135	846030	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	128,000
136	846035	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	13,100
137	870700	FLASHING BEACON SYSTEM	LS	LUMP SUM
138	872130	MODIFYING EXISTING ELECTRICAL SYSTEM	LS	LUMP SUM
139	872140	REMOVING EXISTING ELECTRICAL SYSTEM	LS	LUMP SUM
140	999990	MOBILIZATION	LS	LUMP SUM

SPECIAL PROVISIONS

ORGANIZATION

Special provisions are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*.

Each special provision begins with a revision clause that describes or introduces a revision to the *Standard Specifications* as revised by any revised standard specification.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

AA

DIVISION I GENERAL PROVISIONS

1 GENERAL

Add to section 1-1.01:

Bid Items and Applicable Sections

Item code	Item description	Applicable section
036949	RETROREFLECTIVE SHEETING (TYPE XI) CONSTRUCTION AREA SIGNS	12
036950	WILDLIFE FENCE	80
036951	RETROREFLECTIVE SHEETING (TYPE XI)	82

2 BIDDING

Add between the 1st and 2nd paragraphs of section 2-1.06B:

The Department makes the following supplemental project information available:

Supplemental Project Information

Means	Description
Included in the <i>Information Handout</i>	1) Survey Monumentation Information 1) Maintaining Existing Traffic Management System Elements During Construction 2) Clean Water Act Section 404 Permit 3) Clean Water Act Section 401 Permit 4) California Fish And Game Code 1602 5) Materials Report
Available as specified in the <i>Standard Specifications</i>	1. Pavement Smoothness Survey (ppf) 2. Cross-sections (.dgn, .dwg) 3. Design (.xml) 4. Alignment (.dgn, .xml) 5. Earth Volume (.xml) 6. Original Ground (.dgn)

5 CONTROL OF WORK

Add to the end of section 5-1.09A:

The Department encourages the project team to exhaust the use of partnering in dispute resolution before engagement of an objective third party.

For certain disputes, a facilitated partnering session or facilitated dispute resolution session may be appropriate and effective in clarifying issues and resolving all or part of a dispute.

To afford the project team enough time to plan and hold the session, a maximum of 20 days may be added to the DRB referral time following the Engineer's response to a Supplemental Potential Claim Record.

To allow this additional referral time, the project team must document its agreement and intention in the dispute resolution plan of the partnering charter. The team may further document agreement of any associated criteria to be met for use of the additional referral time.

If the session is not held, the DRB referral time remains in effect as specified in section 5-1.43.

Add to the end of section 5-1.20A:

During the progress of the work under this Contract, work under the following contracts may be in progress at or near the job site of this Contract:

Coincident or Adjacent Contracts

Contract no.	County–Route–Post Mile	Location	Type of work
EA 1E460	Riv-74-PM 37.7/44.7	City of Hemet	Raised Curb Median
EA 1K290	Riv-74-PM 36.90	City of Hemet	Box Culvert

Add to the end of section 5-1.20C:

This project does not include work on the railroad property, but a railroad is shown on the general plan sheet within the project limits. Do not trespass on the railroad property at PM 28.73.

Replace *Reserved* in section 5-1.20D with:

Occupied improvements are within the right-of-way at:

1. 24171
2. 24185
3. 24198
4. 24201
5. 24203
6. 24205

These improvements will be vacated and removed by 5/1/2019.

Do not take any action that will result in unnecessary inconvenience or disproportionate injury to or that is coercive in nature to the occupants of the improvements.

6 CONTROL OF MATERIALS

Add to the beginning of section 6-1.02:

The Department furnishes you with:

- Disks for survey monuments
- Model 2070 E controller assembly, including controller unit, completely wired controller cabinet, and detector sensor units
- Components of battery backup system as follows:
 - Inverter/charger unit
 - Power transfer relay
 - Manually-operated bypass switch
 - Battery harness
 - Utility interconnect wires
 - Battery temperature probe
 - Relay contact wires

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit at District 8 Warehouse, North Region Maintenance MS 9, 175 West Cluster Street, San Bernardino, CA 92408. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

You must furnish replacement plants. The Department does not pay you for the replacement plants.

Add to section 6-1:

6-1.06 BUY CLEAN CALIFORNIA ACT

6-1.06A General

The following materials or products are subject to the Buy Clean California Act (Pub Cont Code § 3500 et seq.):

Material or product	Material specifications
Carbon steel rebar	Section 52-1.02B, "Bar Reinforcement"
Structural steel	Section 55-1.02D(1), "General," – Structural Steel table or Section 99, "Building Construction"
Flat glass	Section 99, "Building Construction"
Mineral wool board insulation	Section 99, "Building Construction"

For product category rules and North America program operators for applicable materials or products, go to the METS website.

For projects with bid opening dates after November 30, 2018, through November 30, 2019, the Department collects existing environmental product declarations for materials or products subject to the Buy Clean California Act.

6-1.06B Definitions

environmental product declaration: Independently verified document created and verified in accordance with International Organization for Standardization (ISO) 14025 for Type III environmental declarations that identifies the global warming potential emissions of the facility-specific material or product through a product stage life cycle assessment.

product category rule: Program operator established rule based on the science of life cycle assessment that governs the development of the environmental product declaration for the material or product.

product stage: Boundary of the environmental product declaration that includes (1) raw material supply, (2) transportation processes, and (3) processing operations, including operations such as melting, mixing, fabrication, finishing, curing, cooling, trimming, packaging and loading for transport delivery. Commonly referred to as a "cradle-to-gate" life cycle assessment.

program operator: Independent agency that supervises and confirms the full environmental product declaration development process in accordance with ISO 14025.

raw material supply: Upstream processes which can include allocations, extraction, refinement, reclamation, handling and processing of the constituents used in producing the material or product.

transportation processes: Includes transportation of raw, reclaimed or recycled material constituents from the supplier to the gate of the manufacturer, producer or fabricator. Includes transport of related waste products.

6-1.06C Submittals

At least 15 days before submitting environmental product declarations, you must register on the Department's Data Interchange for Materials Engineering. Follow the registration process at:

<https://dime.dot.ca.gov/>

Submit available environmental product declarations for applicable materials or products as informational submittals to the Department's Data Interchange for Materials Engineering and provide PDF copies to the Engineer.

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Replace *Reserved* in section 7-1.02K(6)(j)(iii) with:

Section 7-1.02K(6)(j)(iii) includes specifications for handling, removing, and disposing of earth material containing lead.

Lead is present in earth material on the job site. Management of this material exposes workers to health hazards that must be addressed in your lead compliance plan. The average lead concentrations are below 1,000 mg/kg total lead and below 5 mg/L soluble lead. The material on the job site:

1. Is not a hazardous waste
2. Does not require disposal at a permitted landfill or solid waste disposal facility

Lead is typically found within the top 2 feet of material in unpaved areas of the highway. Reuse all of the excavated material on the right-of-way.

Lead has been detected in material to a depth of 2 feet in unpaved areas of the highway. Levels of lead found on the job site range from less than 0.11 to 730 mg/kg total lead with an average concentration of 37.28 mg/kg total lead as analyzed by EPA test method 6010 or EPA test method 7000 series and based upon a 95 percent upper confidence limit. Levels of lead found within the project limits have a predicted average soluble concentration of 2.1 mg/L as analyzed by the California Waste Extraction Test and based upon a 95 percent upper confidence limit.

Handle the material under all applicable laws, rules, and regulations, including those of the following agencies:

1. Cal/OSHA
2. CA RWQCB, Region 8 – Santa Ana
3. CA Department of Toxic Substances Control

If the material is disposed of:

1. Disclose the lead concentration of the material to the receiving property owner when obtaining authorization for disposal on the property
2. Obtain the receiving property owner's acknowledgment of lead concentration disclosure in the written authorization for disposal
3. You are responsible for any additional sampling and analysis required by the receiving property owner

If you choose to dispose of the material at a commercial landfill:

1. Transport it to a Class III or Class II landfill appropriately permitted to receive the material
2. You are responsible for identifying the appropriately permitted landfill to receive the material and for all associated trucking and disposal costs, including any additional sampling and analysis required by the receiving landfill

8 PROSECUTION AND PROGRESS

Replace *Reserved* in section 8-1.04C with:

Section 8-1.04B does not apply.

Start job site activities within 120 days after receiving notice that the Contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department.

Do not start job site activities until the Department authorizes or accepts your submittal for:

1. CPM baseline schedule
2. WPCP or SWPPP, whichever applies
3. Notification of DRA or DRB nominee and disclosure statement
4. Contingency plan for opening closures to traffic

You may enter the job site only to measure controlling field dimensions and locate utilities.

Do not start other job site activities until all the submittals from the above list are authorized or accepted and the following information is received by the Engineer:

1. Notice of Materials To Be Used form.

2. Written statement from the vendor that the order for the sign panels has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
3. Written statement from the vendor that the order for electrical material has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
4. Written statement from the vendor that the order for structural steel has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.

You may start job site activities before the 120th day after Contract approval if you:

1. Obtain specified authorization or acceptance for each submittal before the 120th day
2. Receive authorization to start

Submit a notice 72 hours before starting job site activities. If the project has more than 1 location of work, submit a separate notice for each location.

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DIVISION II GENERAL CONSTRUCTION

12 TEMPORARY TRAFFIC CONTROL

Replace *Reserved* in section 12-3.11B(5) with:

A construction Project Funding Identification C47B(CA)) sign must comply with the specifications for Project Funding Identification signs in section 6F.109(CA) of the *California MUTCD* and specifications at: <http://www.dot.ca.gov/trafficops/tcd/pfi.html>.

The sign must be a wood-post sign complying with section 82-3.

The sign panels must be framed, single-sheet aluminum panels complying with section 82-2.

The background on the sign must be Type XI retroreflective sheeting. The Type XI retroreflective sheeting must be on the Authorized Material List for signing and delineation materials.

The legend must be retroreflective except for nonreflective black letters and numerals. The blue and fluorescent orange must match the color specifications available at the FHWA's MUTCD website.

The legend for the type of project must read as follows:

HIGHWAY IMPROVEMENT

The legend for the types of funding on a construction project funding sign must read as follows and in the following order:

FEDERAL HIGHWAY TRUST FUNDS

STATE HIGHWAY FUNDS

The Engineer provides the year of completion for the legend on the sign. Install a sign overlay for the year of completion within 15 days of notification.

The legend for the year of completion on a construction project funding sign must read as follows:

YEAR OF COMPLETION 2020

Do not add information to the construction project funding sign unless authorized.

Replace *Reserved* in section 12-3.11C(3) with:

Install 2 C47B(CA) by 96 x 60 inch construction project funding identification signs at the location determined by the Engineer before starting major work activities visible to highway users.

Dispose of construction project funding identification signs upon completion of the project if authorized.

Replace the 1st paragraph of section 12-3.11B(1) with:

Construction area signs with rigid substrate must be the product of a commercial sign manufacturer and have Type XI retroreflective sheeting. All rigid substrate temporary traffic control warning signs shall have fluorescent orange background Type XI retroreflective sheeting.

Replace the 4th paragraph of section 12-3.11B(1) with:

A construction area warning or guide sign must have a black legend on a retroreflective, fluorescent orange background. A W10-1 advance warning sign for highway-rail grade crossings must have a black legend on a retroreflective fluorescent yellow background.

Add to the beginning of section 12-3.32C:

Place PCMSs at the locations shown and in advance of the 1st warning sign for each:

1. Stationary lane closure
2. Speed reduction zone

Add between the 9th and 10th paragraphs of section 12-3.32C:

Start displaying the message on the sign 30 minutes before closing the lane or shoulder or when directed by the Engineer.

Replace the table in the definition of *designated holidays* in section 12-4.02A(2) with:

Designated Holidays

Holiday	Date observed
New Year's Day	January 1st
Memorial Day	Last Monday in May
Independence Day	July 4th
Labor Day	1st Monday in September
Thanksgiving Day	4th Thursday in November
Christmas Day	December 25th

Add to section 12-4.02A(2):

special days: Martin Luther King Jr. Day, Washington's Birthday, Cesar Chavez Day, Good Friday thru Easter Sunday, Veterans Day, Day after Thanksgiving, December 20 thru January 2.

Add between the 3rd and 4th paragraphs of section 12-4.02C(1):

If complete ramp closure hours and ramp lane requirements are not included, you may close the ramp adjacent to the closed freeway lane.

Add to the end of section 12-4.02C(1):

Keep the full width of the traveled way open to traffic when no active construction activities are occurring in the traveled way or within 6 feet of the traveled way.

For each 10-minute interval or fraction thereof past the time specified to open the closure, the amount for liquidated damages per interval shown in the table below is deducted. Liquidated damages are limited to 5 percent of the total bid per occurrence. Liquidated damages are not assessed if the Engineer orders the closure to remain in place beyond the scheduled pickup time.

Type of facility	Route	Direction or segment	Period	Liquidated damages/interval
Mainline	Riv 74	EB	1st half hour	\$1,000/10 minutes
			2nd half hour	\$1,000/10 minutes
			2nd hour and beyond	\$1,000/10 minutes
Mainline	Riv 74	WB	1st half hour	\$1,000/10 minutes
			2nd half hour	\$1,000/10 minutes
			2nd hour and beyond	\$1,000/10 minutes

Replace *Reserved* in section 12-4.02C(3)(e) with:

From 3 hours before to 2 hours after special events or events at the venues shown in the table titled "Special Events and Venues," do not perform work that encroaches onto the roadway, connector impacted by the events unless otherwise permitted by the District Traffic Manager.

The special events and venues that could impact closures, as determined by the Resident Engineer, are listed in the table titled "Special Events and Venues" below.

Special Events and Venues						
Venue/ Special Events	Affected Routes	Route Impact	Route/s Limits	Usual Month of event (See website for the exact date)	Website	Contact #
Glen Helen Amphitheater (Glen Helen)	215 15	*** **	University Pkwy to I-15/215 Connector I-60 to Devore Road	Various events May- Oct yearly See web site	www.livenation.com	(909) 880-3090
Glen Helen Speedway	215 15	*** **	University Pkwy to I-15/215 Connector I-60 to Devore Road	Various events Apr- Dec yearly See web site	www.glenhelen.com	(909) 880-3090
Redland Bicycle Classic	38	***	SR-38 from Fawnskin to Stanfield Cut-off	April	http://www.redlandsclassic.com/	(909) 798-0865
Amgen Tour of California	18 38	** **	Big Bear Lake	May	www.amgentourofcalifornia.com	ATOCGeneralInfo @amgentourofcalifornia.com
Auto Club Speedway (California)	10 15 210 66 60	*** *** *** ***	LA I-57 to SBD I-215 I-15/215 to SR-91 Haven to I-215 Haven to Cherry I-15 to County Line	Various events Thru the year See web site	www.autoclubspeedway.com	(909) 429-5000
Temecula Balloon and Wine Festival	15	**	SR-79 (Winchester Rd) and Rancho California	May	www.tvbwf.com	(951) 676-6713
Career Builder Challenge	10	**	Palm Springs off ramp at SR-111	January	http://www.careerbuilderchallenge.com/	(888) 672-4673
ANA Inspiration	10	**	Palm Springs off ramp at SR-111	March/ April	http://www.anainspiration.com/	info@ANAINspiration.com
Festival of Lights (Downtown Riverside)	91	**	I-15 to I-215/SR-60 split	November	http://www.riversidedowntown.org/	(951) 683-7100
March Air Show March Air Reserve Base	215	***	Cactus to Ramona Express Way	April	http://www.marchfieldairfest.com	(951) 655-1110
UCR Graduation	60 215	*** ***	I-215/SR-60/SR-91 split to Central Ave	June	www.commencement.ucr.edu	(951) 787-3144
Laughlin River Run	40	***	I-40/ From I-15 to Arizona State Line	April	http://www.laughlinriverrun.com	(949) 502-3434
Thunder & Lightning Powwow	10	***	I-10/ Morongo Valley	September	http://www.morongocasinoresort.com/pow2.cfm	(800) 252-4499 ext.#: 23800
Coachella Valley Music and Arts Festival	10 111	*** ***	I-10/Beaumont to Coachella 111/Whitewater to Coachella	April	www.coachella.com	info@coachella.com
Stagecoach Music Festival	10 111	*** ***	I-10/Beaumont to Coachella 111/Whitewater to Coachella	April	http://www.stagecoachfestival.com/	info@stagecoachfestival.com
King of Hammers	247	***	sbd18 to 62	Around Feb. (for the date go online/call)	http://www.griffinrad.com/kingofthehammers/ https://ultra4racing.com/race/17	1-800-722-3723 or Dave Cole 909 273 0216
Redlands University Graduation	10	***	I-10 Redlands	April	http://www.redlands.edu/	(909) 793-2121
High School Graduation	10	***	I-10 Redlands	June	http://rhs.redlandsusd.net/	(909) 307-5300

** Designates Moderate Impact (20 minute delay or less)

*** Designates High Impact (30 minute delay or less)

Note 1: The dates of events change yearly. Contact information and websites are provided to verify exact dates.

Note 2: Other special events do exist that impact our freeway and highway system. Close coordination with the local agencies and other impacted entities must be carried out before conducting work that requires full or partial closures.

Replace *Reserved* in section 12-4.02C(3)(f) with:

Closure restrictions for designated holidays and special days are shown in the following table:

Lane Closure Restrictions For Designated Holidays And Special Days											
Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Mon
x	H xx	xx	xx								
	SD xx										
x	xx	H xx	xx								
		SD xx									
	x	xx	H xx	xx							
			SD xx								
	x	xx	xx	H xx	xxx						
	x	xx	xx	SD xx	xxx						
				x	H xx						
				x	SD xx						
					x	H xx					
						SD xx					
						x	H xx	xx	xx	xx	xxx
							SD xx				
Legend:											
	Refer to lane requirement charts.										
x	The full width of the traveled way must be open for use by traffic after 0600.										
xx	The full width of the traveled way must be open for use by traffic.										
xxx	The full width of the traveled way must be open for use by traffic until 1800.										
H	Designated holiday										
SD	Special day										

Replace *Reserved* in section 12-4.02C(3)(k) with:

Comply with the requirements for the conventional highway lane closures shown in the following charts:

Chart No. K1 Conventional Highway Lane Requirements																										
County: Riverside										Route/Direction:74/EB										Post Mile:28.1/34.7						
Closure limits:																										
Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Mon– Thu	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fri	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Legend:																										
1		Provide at least 1 through traffic lane open in the direction of travel.																								
		Work is allowed within the highway where a shoulder or lane closure is not required.																								
REMARKS:																										

Chart No. K2 Conventional Highway Lane Requirements																										
County: Riverside										Route/Direction:74/WB										Post Mile:28.1/34.7						
Closure limits:																										
Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Mon– Thu	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fri	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Legend:																										
1		Provide at least 1 through traffic lane open in the direction of travel.																								
		Work is allowed within the highway where a shoulder or lane closure is not required.																								
REMARKS:																										

Add to the end of the 1st paragraph of section 12-4.02C(7)(a):

except you may use a moving closure during traffic striping and pavement marker placement using a bituminous adhesive. Do not use a moving lane closure when grinding for recessed striping and recessed markers.

Add to the end of section 12-4.02C(7)(a):

Except where prohibited, use an impact attenuator vehicle:

1. To follow behind equipment and workers who are placing and removing components of a closure.
Operate the flashing arrow sign in the arrow or caution mode during this activity, whichever applies.
Follow at a distance that prevents intrusion into the work space from passing traffic.
2. As a shadow vehicle in a moving lane closure.

After placing components of a stationary traffic control system, you may place the impact attenuator vehicle in advance of the work area or at another authorized location to protect traffic and workers.

Add to the end of section 12-4.02C(7)(b):

Additional advance flaggers are required.

Except for one-way-reversing traffic-control lane closures, the maximum length of the work area inside a closure is 2 miles.

Not more than 2 stationary closures are allowed in each direction of travel at one time.

Concurrent stationary closures in the same direction of travel must be spaced no closer than 2 miles apart. Closures in the same direction of travel on alternating inside lanes and outside lanes must be spaced by an additional 2 miles.

Closure spacing is the distance between the last cone of the upstream closure and the temporary sign W20-1 of the downstream closure. The number of lanes open in the upstream closures must be less than or equal to the number of lanes open in the downstream closures. For multiple closures in each direction of travel, pick up the downstream closures first.

For a stationary one-way-reversing traffic-control lane closure, you may stop traffic in 1 direction for periods not to exceed 10 minutes. After each stoppage, all accumulated traffic for that direction must pass through the work zone before another stoppage is made.

The maximum length of a single stationary one-way-reversing traffic-control lane closure is 2 miles between flaggers.

Not more than 1 stationary one-way-reversing traffic-control lane closures will be allowed at one time. Concurrent closures in the same direction of travel must be spaced no closer than 1 miles apart.

Transport bicyclists through the one-way-reversing traffic-control work zone.

For traffic under one-way-reversing traffic control on unpaved areas, the cones shown along the centerline are not required.

You may use a pilot car to control traffic. If a pilot car is used to control traffic, the cones shown along the centerline are not required. Pilot cars must have cellular or radio contact with other pilot cars and personnel in the work zone. The maximum speed of the pilot cars convoying or controlling traffic through the traffic control zone is 25 mph. Pilot cars must only use traffic lanes open to traffic.

13 WATER POLLUTION CONTROL

Add to the end of section 13-3.01A:

This project's risk level is 2.

14 ENVIRONMENTAL STEWARDSHIP

Add to the end of section 14-1.02:

An ESA exists on this project.

Before starting job site activities, install Temporary Silt Fence to protect the ESA and mark its boundaries.

Limited access to the ESA is allowed for Contractor Supplied Biologist. Notify the Engineer 5 business days or less before the planned entry date. Any other access to the ESA is prohibited.

More than one ESA exists on the job site. Use the management measures for the corresponding ESA shown in the following table:

ESA Management

Identification	Location	Management measures
Bio ESA 1	As per plans, PM 29.6- PM 29.8	Before starting work, install Temporary Silt Fence to protect the ESA and protect its boundaries.
Bio ESA 2	As per plans, PM 30.4 – PM 30.5	Before starting work, install Temporary Silt Fence to protect the ESA and protect its boundaries.
Bio ESA 3	As per plans, PM 31.5 – PM 31.6	Before starting work, install Temporary Silt Fence to protect the ESA and protect its boundaries.
Bio ESA 4	As per plans, PM 35.8 – PM 36.0	Before starting work, install Temporary Silt Fence to protect the ESA and protect its boundaries.
Bio ESA 5	As per plans, PM 36.1 – PM 37.0	Before starting work, install Temporary Silt Fence to protect the ESA and protect its boundaries.
Bio ESA 6	As per plans, PM 36.37 -PM 36.92	After installing Temporary Still Fence, install Wildlife Fence to permanently protect wildlife area and ESA.

Access to an ESA other than that described is prohibited.

Add to the 1st paragraph of section 14-6.03A:

This project is within or near habitat for the regulated species shown in the following table:

Regulated Species

Burrowing Owl
California Orcutt Grass
Many Stemmed Dudleya
Munz's Onion
San Diego Ambrosia
Smooth Tarplant
Spreading Navarretia
Wrights Trichocornis

This project includes the sensitive habitats shown in the following table:

Sensitive Habitats

Critical Habitat for Spreading Navarretia
Criteria Area Plant Species Survey Area 3
Narrow Endemic Plant Species Survey Area 3
Riverside Conservation Authority Conservation Area
Sensitive vernal pool habitat

Replace item 1 in the 2nd paragraph of section 14-6.03A with:

1. Stop all work within a 50-foot radius of the discovery

Add to section 14-6.03A:

Species protection areas within the project limits are as specified in the following table:

Species Protection Areas

Identification name	Location
Species Protection Area 1	Entire project limits

Comply with the following biological resource information requirements:

1. Ensure that all vehicles and heavy equipment are clean and free of mud and debris prior to arrival at the project site.

Within Species Protection Area 1, implement the following protection measures:

1. The Resident Engineer or other identified authority in charge of implementation of project work, hereby known as the Engineer, has authority to stop work on a project. The authorized biologists and/or Contractor Supplied Biologists (CSB) hereby known as Biologist can recommend to the Engineer to halt any activity that may pose a threat to regulated species. The Biologist may recommend working crews how to direct movements of equipment and personnel to avoid injury or mortality to regulated species.
2. Biologist must be present onsite prior to earthwork activities to clear the site/s of sensitive biological resource.
3. The Biologist shall immediately notify the Engineer of any discovered species and recommend protective radius or cessation of work, as required to protect the species.
4. Immediately prior to the start of any ground disturbing activities, the Biologist must conduct clearance surveys for the Burrowing Owls. If Burrowing Owls are found at a project site where Caltrans had previously concluded they were unlikely to occur, Caltrans will contact the United States Fish And Wildlife Service (USFWS) and the California Department Of Fish And Wildlife (CDFW) to determine if the implementation of additional protective measures would be appropriate.
5. The Biologist must conduct Monitoring Type: "Fence installation monitoring". Where CSB must be present to monitor and ensure no biological resources are unlawfully harmed or damaged during installation and removal of Temporary Silt Fence for this project.
6. The contractor under the supervision of the Biologist will install Temporary Silt Fence as exclusion fencing for the Environmentally Sensitive Area (ESA). The Biologist can install this fencing alone if needed. The Temporary Silt Fence must be installed as per the plans.
7. The Biologist must conduct Monitoring Type: "Fence integrity inspection". The CSB must inspect the Temporary Silt Fence in its entirety, one a week, every week that work continues in the vicinity of the ESA, to ensure for integrity of the fence. The Biologist must also supervise/conduct the repair of any section of this fence that is damaged or improperly set to monitor and ensure no biological resources are unlawfully harmed or damaged.

8. No firearms or pets, including dogs, will be allowed within the work area. Firearms carried by authorized security and law enforcement personnel and working dogs under the control of a handler will be exempt from this protective measure.
9. During all off road cross country travel outside of biologically cleared work limits, the Biologist must select and flag the access route to avoid burrows, nests, and to minimize disturbance of vegetation. The Biologist must walk in front of the lead vehicle to ensure that no regulated species, burrows, or nests are present. All vehicles must follow the lead vehicle's tracks and stay within the designated access route

Monitor regulated species according to the schedule shown in the following table:

Monitoring type	Schedule
Biological	1. For conducting Bio Clearance on newly disturbed areas and staging areas. 2. If no new ground is disturbed, then once every two weeks.
Fence integrity inspection	Weekly, so long as work is near within 0.1 mile of the ESA.
Fence installation	During fence installation

Replace the 2nd and 3rd paragraphs of section 14-6.03D(1) with:

Add to section 14-6.03D(1):

A Contractor-supplied biologist who performs specialized activities must have demonstrated field experience working with the regulated species or performing the specialized task. The biologist must have experience that complies with the requirements shown in the following table:

Specialized activity/species	Requirements
Burrowing Owl	As required by PLACs
Narrow Endemic Plant Species	Identify

Within as required by PLACs days before starting job site activities, submit protocols for species protection surveys. Use protocols required in the PLACs.

Survey the job site for regulated species and submit a preconstruction survey report within 14 days before starting work.

The preconstruction survey report must include one of the following:

1. Detailed observations and locations where regulated species were observed
2. Statement that no regulated species were observed

Submit an initial monitoring report as an informational submittal within 12 hours after starting ground-disturbing activities.

Submit monitoring reports according to the following schedule:

Monitoring type	Report schedule
Biological	Every two weeks

Submit a biological resource incident report within 24 hours of the incident.

The incident report must include:

1. Description of any take of regulated species or any violation of a biological resource PLAC
2. Species name and number taken
3. Details of required notifications with contact information
4. Corrective actions proposed or taken
5. Disposition of taken species

Submit an annual monitoring report no later than January 15 during each year of construction.

The annual monitoring report must include:

1. Start and end dates of construction
2. Project impacts on the regulated species
3. Species protection measures and implementation details
4. Incidental take details, including species name, number taken, people contacted, contact information, and disposition of taken species
5. Assessment of the effectiveness of the species protection measures in mitigating project impacts
6. Recommendations for improving species protection measures

Submit a final monitoring report no later than 20 days after completion of the project. If the report requires revisions, the Department provides comments. Submit a revised report within 7 days of receiving comments. The final monitoring report must be a cumulative report including:

1. Start and end dates of construction
2. Project impacts on the regulated species
3. Species protection measures and implementation details
4. Incidental take details, including species name, number taken, people contacted, contact information, and disposition of taken species
5. Assessment of the effectiveness of the species protection measures in mitigating project impacts
6. Recommendations for improving species protection measures

Replace *Reserved* in section 14-6.03D(3) with:

Prepare and present a biological resource information program to familiarize personnel with regulated species and habitats, related laws and regulations, and species protection measures and protocols.

The biological resource information program must include:

1. Identification of the job site, ESAs, and species protection areas
2. Description of the regulated species and its general ecology
3. Description of habitats used by the regulated species and their locations
4. Requirements for protecting regulated species
5. Definition and consequences of take of regulated species
6. Permit requirements for touching or moving a regulated species
7. Requirements for species protection
8. Description of avoidance and minimization measures

A Contractor-supplied biologist must develop the program and present the biological resource training.

Submit an outline of your program within 7 days after Contract approval. If the submittal is rejected, submit a revised outline within 7 days of receiving the rejection.

Allow 15 days for the Department's review of your outline of the program.

Notify the Engineer at least 7 days before the 1st training session. Submit an attendance list with the printed and signed name of each attendee within 2 business days after each session. Submit a separate attendance list for each subsequent training session for new personnel.

Personnel who must complete biological resource training include laborers, tradesmen, material suppliers, equipment maintenance staff, supervisors, foremen, office staff, food vendors, and other workers who stay at the job site longer than 30 minutes.

Provide a handout that describes the regulated species, their habitats, and protection measures as listed in species protection or in PLACs.

Add after the 2nd paragraph of section 14-11.12A:

This project includes removal of yellow thermoplastic traffic stripe and yellow pavement marking that will produce hazardous waste residue.

Add after the 1st paragraph of 14-11.12E:

After the Engineer accepts the analytical test results, dispose of yellow thermoplastic and yellow paint hazardous waste residue at a Class 1 disposal facility located in California 30 days after accumulating 220 lb of residue.

If less than 220 lb of hazardous waste residue and dust is generated in total, dispose of it within 30 days after the start of accumulation of the residue.

Add to the 1st paragraph of section 14-11.14A:

Wood removed from roadside sign is treated wood waste.

Replace "Reserved" in section 14-11.15 with:

14-11.15A General

Section 14-11.15 includes specifications for disposing of electrical equipment containing hazardous materials.

14-11.15B Submittals

14-11.15B(1) General

Reserved

14-11.15B(2) Identification of Disposal Facilities

Thirty days before starting work submit the name and address of the appropriately permitted facilities where universal wastes and fluorescent light ballasts containing PCBs will be taken to dispose of them.

14-11.15C Waste Management

14-11.15C(1) Universal Waste

Batteries as described in 22 CA Code Regs § 66273.2, light bulbs, mercury lamps, and fluorescent tubes, bulbs, and lamps are universal waste. Manage universal waste under 22 CA Code Regs § 66261.9.

Transport batteries, light bulbs, mercury lamps and fluorescent tubes, bulbs, and lamps to an appropriately permitted recycling or disposal facility.

Vehicle sensor nodes (VSN) contain lithium thionyl chloride (LTC) batteries. Thionyl chloride is designated as an extremely hazardous waste under 22 CA Code of Regs, Div 4.5, Ch 11, Art 5, App 10. Each VSN includes 1 integral LTC battery.

Package removed VSNs containing undamaged LTC batteries and place the packages in US DOT approved sealed shipping containers. Transport the containers to a recycling or disposal facility. Notify the receiving facility 48 hours before delivery. Affix a label to containers of intact VSNs identifying the contents as "Universal Waste: Lithium Thionyl Chloride Batteries."

Ship VSN batteries that are separated from a VSN to a recycling or disposal facility under 49 CFR 173.185. Package the batteries such that contact between them and resulting short circuits are avoided. Prevent accidental contact between batteries by:

1. Covering terminal ends to prevent them from touching each other
2. Placing batteries in a sealed plastic bag packed with loose fill, such as vermiculite

1. Not be higher than 5 feet
2. Not be covered with a material that will stop air circulation, increase soil temperatures, or harm beneficial biological activity and resident seeds
3. Be marked with signs and flags as *Topsoil*

Add to the end of section 19-3.02E:

Slurry cement backfill may contain returned plastic concrete.

Slurry cement backfill containing returned plastic concrete must comply with the specifications for concrete containing returned plastic concrete.

20 LANDSCAPE

Add to section 20-3.01B(3)(a):

Soil amendment must be nitrolized fir bark.

This project has a Type 2 plant establishment period.

Apply organic fertilizer to the plants during the 1st week of May and October of each year.

21 EROSION CONTROL

Replace section 21-2.02K with:

21-2.02K Compost

Compost must be derived from one or a combination of the following types of materials:

1. Green material consisting of chipped, shredded, or ground vegetation or clean, processed, recycled wood products
2. Biosolids
3. Manure
4. Mixed food waste

Compost must not be derived from mixed municipal solid waste and must not contain paint, petroleum products, pesticides, or other chemical residues harmful to plant or animal life. Metal concentrations in compost must not exceed the maximum listed under 14 CA Code of Regs § 17868.2.

Process compost materials under 14 CA Code of Regs § 17868.3.

The quality characteristics of compost must have the values shown in the following table:

Compost			
Quality characteristic	Test method ^a	Requirement	
		Fine	Medium/Coarse
pH	TMECC 04.11-A	6–8.5	6-8.5
Soluble salts (dS/m)	TMECC 04.10-A	0–10	0-10
Moisture content (% wet weight)	TMECC 03.09-A	25–60	25-60
Organic matter content (% dry weight)	TMECC 05.07-A	30–70	30-100
Maturity (seed emergence) (% relative to positive control)	TMECC 05.05-A	80 or above	80 or above
Maturity (seedling vigor) (% relative to positive control)	TMECC 05.05-A	80 or above	80 or above
Stability (mg CO ₂ -C/g OM per day)	TMECC 05.08-B	5 or below	8 or below
Pathogen Salmonella (most probable number per 4 grams dry weight basis)	TMECC 07.01-B	< 3	< 3
Pathogen Fecal coliform (most probable number per gram dry weight basis)	TMECC 07.01-B	< 1,000	< 1,000
Physical contaminants (% dry weight) Plastic, glass, and metal	TMECC 02.02-C	combined total: < 0.5	combined total: < 1.0
Film plastic (% dry weight)	TMECC 02.02-C	Combined total: < 0.1%	Combined total: < 0.1%

^a TMECC refers to *Test Methods for the Examination of Composting and Compost*, published by the United States Department of Agriculture and the United States Compost Council (USCC).

The particle size must comply with the requirements shown in the following table:

Compost Gradation			
Quality characteristic	Test method ^a	Requirement	
		Min	Max
Gradation Fine:(dry weight % passing) 1-inch sieve 3/8-inch sieve	TMECC 02.02-B	100 95	-- --
Gradation Medium:(dry weight % passing) 2-inch sieve 3/8-inch sieve	TMECC 02.02-B	95 40	-- 55
Gradation Coarse:(dry weight % passing) 3-inch sieve 3/8-inch sieve	TMECC 02.02-B	95 25	-- 35

^a TMECC refers to *Test Methods for the Examination of Composting and Compost*, published by the United States Department of Agriculture and the United States Compost Council (USCC).

AA

DIVISION V SURFACINGS AND PAVEMENTS

36 GENERAL

Replace *Reserved* in section 36-4 with:

36-4.01 GENERAL

Section 36-4 includes specifications for performing work involving residue from grinding and cold planing that contains lead from paint and thermoplastic.

36-4.02 MATERIALS

Not Used

36-4.03 CONSTRUCTION

The residue from grinding or cold planing contains lead from paint and thermoplastic. The average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. This residue:

1. Is a nonhazardous waste
2. Does not contain heavy metals in concentrations that exceed thresholds established by the Health and Safety Code and 22 CA Code of Regs
3. Is not regulated by the Federal Resource Conservation and Recovery Act, 42 USC § 6901 et seq.

Management of this material exposes workers to health hazards that must be addressed in your lead compliance plan.

36-4.04 PAYMENT

Not Used

39 ASPHALT CONCRETE

Replace section 39-2.01C(3)(c) with:

39-2.01C(3)(c) Prime Coat

Apply a slow-setting asphaltic emulsion as a prime coat to AB areas designated by the Engineer and at a spread rate from 0.15 to 0.40 gal/sq yd. Do not apply more prime coat than can be absorbed completely by the AB in 24 hours.

You may modify the prime coat application rates if authorized.

Close areas receiving prime coat to traffic. Do not allow tracking the prime coat onto pavement surfaces beyond the job site.

Replace the *row* for Moisture susceptibility, dry strength (min, psi) in the 1st paragraph of section 39-2.02B(2) with:

For RAP Substitution greater than 15% moisture susceptibility (max, psi, dry strength)	AASHTO T 283 ^c	300 ^e
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Add a footnote to the table in the 1st paragraph of section 39-2.02B(2):

^eNot required for the following areas in District 8:

1. Riverside County: route 10, post mile 56.95 to 156.49; route 111, post mile 0.00 to 28.53
2. San Bernardino County: route 15, post mile 29.00 to 186.24; route 40; route 58; route 138, post mile 0.00 to 15.20; route 395

Replace the row for Moisture susceptibility, wet strength (min, psi) in the table in the 1st paragraph of section 39-2.02B(2) with:

Moisture susceptibility (min, tensile strength ratio)	AASHTO T 283 ^c	70
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Material	Manufacturer
SlurryPro CDP	KB INTERNATIONAL LLC 735 BOARD ST STE 209 CHATTANOOGA TN 37402 (423) 266-6964
Super Mud	PDS CO INC 105 W SHARP ST EL DORADO AR 71731 (870) 863-5707
Shore Pac GCV	CETCO CONSTRUCTION DRILLING PRODUCTS 2870 FORBS AVE HOFFMAN ESTATES IL 60192 (800) 527-9948
Terragel or Novagel Polymer	GEO-TECH SERVICES LLC 220 N. ZAPATA HWY STE 11A-449A LAREDO TX 78043 (210) 259-6386
BIG FOOT	MATRIX CONSTRUCTION PRODUCTS 50 S MAIN ST STE 200 NAPERVILLE IL 60540 (877) 591-3137
POLY-BORE	BAROID INDUSTRIAL DRILLING PRODUCTS 3000 N SAM HOUSTON PKWY EAST HOUSTON TX 77032 (877) 379-7412

Use synthetic slurries in compliance with the manufacturer's instructions. Synthetic slurries shown in the above table may not be appropriate for a given job site.

Synthetic slurries must comply with the Department's requirements for synthetic slurries to be included in the above table. The requirements are available from the Offices of Structure Design, P.O. Box 168041, MS# 9-4/11G, Sacramento, CA 95816-8041.

SlurryPro CDP synthetic slurry must comply with the requirements shown in the following table:

SlurryPro CDP		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	$\leq 67.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	50–120
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 70
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Super Mud synthetic slurry must comply with the requirements shown in the following table:

Super Mud		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	$\leq 64.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	32–60
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 60
pH	Glass electrode pH meter or pH paper	8.0–10.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Shore Pac GCV synthetic slurry must comply with the requirements shown in the following table:

Shore Pac GCV		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	$\leq 64.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	33–74
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 57
pH	Glass electrode pH meter or pH paper	8.0–11.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Terragel or Novagel Polymer synthetic slurry must comply with the requirements shown in the following table:

Terragel or Novagel Polymer		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	$\leq 67.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	45–104
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 104
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

BIG-FOOT synthetic slurry must comply with the requirements shown in the following table:

BIG-FOOT		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	$\leq 64.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	30–125
Before final cleaning and immediately before placing concrete (sec/qt)		55–114
pH	Glass electrode pH meter or pH paper	8.5–10.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

POLY-BORE synthetic slurry must comply with the requirements shown in the following table:

POLY-BORE		
Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	62.8-65.8 ^a
Before final cleaning and immediately before placing concrete (pcf)		62.8-64.0 ^a
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	50–80
Before final cleaning and immediately before placing concrete (sec/qt)		50-80
pH	Glass electrode pH meter or pH paper	7.0–10.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

51 CONCRETE STRUCTURES

Add to section 51-1.01A:

The concrete at the medians must be integrally pigmented colored concrete. The color must match the referee sample located at the median nose taper of West Florida Avenue, directly east of Myers Street in the City of Hemet.

AA

DIVISION VIII MISCELLANEOUS CONSTRUCTION

73 CONCRETE CURBS AND SIDEWALKS

Add to section 73-1.02A:

Concrete must be minor concrete complying with section 90-2 and may contain returned plastic concrete complying with section 90-9.

Add to section 73-3.01C:

Within 2 business days of completing the surveys, submit preconstruction and post-construction surveys sealed and signed by one of the following:

1. Land surveyor licensed in the State
2. Engineer who is registered as a civil engineer in the State

Replace *Reserved* in section 73-3.01D(3) with:

For locations shown, perform a preconstruction survey to ensure forms and job site constraints will allow for compliance with required design dimensions and slopes shown. Upon completing the work, perform a post-construction survey to verify design dimensions and slopes requirements are met. The post-construction survey must include a minimum of 3 measurements for each dimension and slope requirement shown. Individual measurements must be equally distributed across the specified slope or dimensional surface. Document and submit these measurements on the Americans with Disabilities Act Compliance Inspection Report form for the facility type shown. Include the equipment and control used to conduct the survey.

Add to the beginning of section 73-3.03:

Before placing concrete, verify that forms and job site constraints allow the required dimensioning and slopes shown. Immediately notify the Engineer if you encounter job site conditions that will not accommodate the design details. Ordered modifications are change order work.

77 LOCAL INFRASTRUCTURE

Replace “RESERVED” section 77-1 of the RSS for section 77 with:

77-1 EMERGENCY VEHICLE DETECTION CABLES

77-1.01 GENERAL

77-1.01A Summary

Section 77-1 includes specifications for constructing emergency vehicle detection cables.

The emergency vehicle detection cables are shown on the electrical plans.

77-1.01B Definitions

Not Used

77-1.01C Submittals

Not Used

77-1.01D Quality Assurance

Not Used

77-1.02 MATERIALS

77-1.02A General

Not Used

77-1.02B Detector Cables

The cable must have 3 LDPE insulated conductors no. 20 stranded tinned copper. The conductors' minimum insulation thickness must be 25 mils and color coded: 1 yellow, 1 blue, and 1 orange.

The cable shield must be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where film is used, a no. 20 stranded tinned bare drain wire must be provided.

The cable jacket must be rated 600 V(ac) and 80 degrees C and be black PVC with a minimum thickness of 43 mils.

The outside diameter of the cable must not exceed 0.35 inch.

The capacitance between any conductor and the other conductors and the shield must not exceed 48 pF per foot at 1,000 Hz.

77-1.03 CONSTRUCTION

Install cables in the controller cabinet. Do not splice the cable. Terminate the cable under the manufacturer's instructions.

Not Used

Replace *Reserved* in section 80-2.02A with:

[illegible]

82 SIGNS AND MARKERS

Payment for Type XI retroreflective sheeting is not included in the payment for furnishing any type of sign panel.

Replace item 1 in the list in the 2nd paragraph of section 83-2.02C(1)(a) with:

- Replace item 2 in the list in the 2nd paragraph of section 83-2.02C(1)(a) with:**

- Add to section 83-2.02C(1)(a):**

Replace *Reserved* in section 83-2.02C(3) with:

The offset from the face of the adjacent midwest guardrail system to the hinge point must be transitioned from the offset at the Type WB-31 transition railing to 4'-0" using a ratio of 6:1.

83-2.04B(1)(a) Summary

37

83-2.04B(1)(b) Definitions

Not Used

83-2.04B(1)(c) Submittals

Submit a certificate of compliance for alternative in-line terminal systems.

83-2.04B(1)(d) Quality Assurance

For each model of alternative in-line terminal system being installed, obtain the manufacturer's check list for the assembly and installation of the alternative in-line terminal systems from the manufacturer's representative or distributor. Notify the Engineer of the alternative in-line terminal systems to be installed at each location before starting installation activities. Complete, sign, and date the check list for each installed in-line terminal system and submit a copy of the completed and signed check list for each installed location, and include the following:

1. Contract number
2. Name of installation Contractor
3. Flare offset used in layout
4. Date of installation
5. Location on the project by post mile, and by station if stationing shown on plans
6. Name and signature of individual completing the checklist.

The Engineer signs and dates the completed check lists, verifying the in-line terminal system at each location was assembled and installed under the manufacturer's instructions and as described.

Use personnel trained by the manufacturer to install in-line terminal systems. A record of training provided by the manufacturer may be requested by the Engineer at any time.

83-2.04B(2) Materials

1. Type SoftStop terminal systems must be SoftStop End Terminal System manufactured by Trinity Highway Products, LLC, and must include the connection components. Type SoftStop terminal system - Type SoftStop terminal system must be a SoftStop terminal with a System length of 50'-9½" for test level 3 and a system length of 38'-3½" for test level 2, manufactured by Trinity Highway Products, LLC, and must include items detailed for SoftStop terminal system, as shown. The SoftStop terminal can be obtained from the manufacturer:

Address	Telephone no.
TRINITY HIGHWAY PRODUCTS LLC PO BOX 99 CENTERVILLE UT 84012	(800) 772-7976

2. Type MSKT - Type MSKT terminal system must be a 31" MSKT Guard Rail End Terminal with a system length of 50'-0" as manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type MSKT terminal system shown on the plans. The MSKT Guard Rail End Terminal can be obtained from the distributor:

Address	Telephone no.
UNIVERSAL INDUSTRIAL SALES PO BOX 699 PLEASANT GROVE UT 84062	(801) 785-0505
GREGORY INDUSTRIES INC 4100 13TH ST SW CANTON OH 44708	(330) 477-4800

3. Type MAX-Tension Tangent Guardrail End Treatment by Barrier Systems, Inc. is a tangent, re-directive gating guardrail terminal. The MAX-Tension has a length of 55 feet, ½ inch, and can be flared for an offset of 0 to 2 feet at the head. The MAX-Tension terminal can be obtained from the distributor:

Address	Telephone no.
STATEWIDE SAFETY AND SIGNS INC 130 GROBRIC COURT FAIRFIELD CA 94533	(800) 770-2644

83-2.04B(3) Construction

Identify each terminal system by painting the type of terminal system in 2-inch-high, neat, black letters and figures on the backside of the rail element between system posts number 4 and 5. Paint must be metallic acrylic resin type spray paint. Before applying terminal system identification, the surface to receive terminal system identification must be free of all dirt, grease, oil, salt, or other contaminants by washing the surface with detergent or other suitable cleaner. Rinse thoroughly with fresh water and allow to fully dry.

Install Type SoftStop terminal system under the manufacturer's installation instructions. For Type SoftStop terminal system, use W6 x 8.5 steel yielding terminal posts for Posts 1 and 2 and standard W6 x 8.5 steel posts for the other posts. Drive all posts or place them in drilled holes. Backfill the space around the posts with selected earth that is free of rock. Moisten and thoroughly compact each layer. For the terminal with a system length of 50'-9½" or system length of 38'-3½", all blocks must be wood or plastic and must be 8 or 12 inches deep.

Install Type MSKT terminal system under the manufacturer's installation instructions. For Type MSKT terminal system, install a W6x15 at lower section Post 1 with a soil plate attached and a 6"x6"x ⅛" tube section at upper section Post 1. Install a W6x9 or W6x8.5 post assembly top and post assembly bottom at Post 2. Install W6x9 or W6x8.5 at Posts 3 through 8. Attach a 9'-4 ½" W-beam MGS rail section to Post 3. Use 8" blocks. The posts must be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Do not pound on the side plates when installing lower post #1 and lower post #2. Space around the posts must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted.

Install Type MAX-Tension terminal system under the manufacturer's installation instructions. Use 8" or 12" wood or composite blocks. Install W6x8.5 or W6x9 at post positions after Post 1. Backfill the space around the posts with selected earth that is free of rock. The posts must be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the posts must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted.

83-2.04B(4) Payment

Not Used

84 MARKINGS

Replace *Reserved* in section 84-9.03C with:

Residue from the removal of painted or thermoplastic traffic stripes and pavement markings contains lead from the paint or thermoplastic. The average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. This residue:

1. Is a nonhazardous waste
2. Does not contain heavy metals in concentrations exceeding the thresholds established by the Health and Safety Code and 22 CA Code of Regs
3. Is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

Management of this material exposes workers to health hazards that must be addressed in your lead compliance plan.

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DIVISION X ELECTRICAL WORK

86 GENERAL

Replace the 1st sentence of the 15th paragraph of section 86-1.02P(2) of the RSS with:

The interior of the enclosure must accept the plug in circuit breakers. The circuit breakers must be mounted on energized bus clips and vertically with the up position of the handle being the *ON* position.

86-1.02Q(3)(a) Multiple AC Outlet Strip

The multiple AC outlet strip must:

1. Be 19 inch, rack mountable
2. Have a minimum of 6 receptacle outlets
3. Be rated for 15 A, 125 V(ac)
4. Have internal 12 A, 125 V(ac) circuit breaker
5. Rated for 36,000 A surge current protection Hot to Neutral
6. UL 1449 rating for 400 V minimum
7. Cord 6 feet minimum

87 ELECTRICAL SYSTEMS

Replace the 1st sentence in the 9th paragraph for section 87-1.03A with:

The shutdown of traffic signal systems is allowed only between the hours of 9:00AM and 3:00PM.

Replace the 21st paragraph for section 87-1.03A with:

The Department places identification characters on the electrical equipment.

Add to the beginning for section 87-1.03B(3)(a):

Use Type 3 Schedule 80 conduit for underground installation.

Replace the 3rd paragraph for section 87-1.03C(1) with:

Install a pull box on a bed of crushed rock.

Deliver the battery backup system cabinet to be assembled to the Department's maintenance electrical shop at:

18745 Conard Avenue, Lake Elsinore CA 92530

The Department notifies you when the assembled Model 332L cabinet with battery backup system cabinet is ready for pick up.

Install the assembled Model 332L cabinet with battery backup system cabinet on the foundation.

Replace the 1st paragraph for section 87-1.03F(2)(c)(ii) with:

Install a Type B loop detector lead-in cable in conduit.

Replace the 1st paragraph for section 87-1.03F(3)(c)(ii) with:

Use a Type 2 loop wire. Use only Type 2 loop wire for Type E loop detectors.

Delete the 3rd paragraph for section 87-1.03G.

Replace the 2nd paragraph for section 87-1.03H(2) with:

Use Method B to insulate a splice.

A manufacturer's representative must program the accessible pedestrian signals at the following intersections:

1. Intersection of Route 74 and Sherman Rd
2. Intersection of Route 74 and Antelope Rd
3. Intersection of Route 74 and Palomar Rd
4. Intersection of Route 74 and Briggs Rd
5. Intersection of Route 74 and Leon Rd
6. Intersection of Route 74 and Juniper Flats Rd
7. Intersection of Florida Ave (Route 74) and Warren Rd
8. Intersection of Florida Ave (Route 74) and Myers St

When the extended pushbutton press is used, program the signals with messages for each street as follows:

1. During the pedestrian clearance interval, the message heard must be,
 - 1.1 Wait to Cross Sherman. Wait.
 - 1.2 Wait to Cross Antelope. Wait.
 - 1.3 Wait to Cross Palomar. Wait.
 - 1.4 Wait to Cross Briggs. Wait.
 - 1.5 Wait to Cross Leon. Wait.
 - 1.5 Wait to Cross Juniper Flats. Wait.
 - 1.6 Wait to Cross Warren. Wait.
 - 1.7 Wait to Cross Myers. Wait.
 - 1.8 Wait to Cross Highway 74. Wait.
 - 1.9 Wait to Cross Florida. Wait.

Add between the 11th and 12th paragraphs for section 87-1.03V(2):

Use hot-melt asphalt rubberized sealant to fill slots.

Replace "RESERVED" section 87-9 with:

87-9 VIDEO IMAGE VEHICLE DETECTION SYSTEM

87-9.01A General

Section 87-9.01 includes installing video image vehicle detection system (VIVDS) for traffic signals.

87-9.01B Definitions

Video Detection Unit (VDU): Processor unit that converts the video image from the camera and provides vehicle detection in defined zones. Unit includes an image processor, extension module, and communication card.

Video Image Sensor Assembly (VIS): An enclosed and environmentally-protected camera assembly used to collect the video image.

Video Image Vehicle Detection System (VIVDS): A system that detects video images of vehicles in defined zones and provides video output.

87-9.01C Submittals

Submit documentation within 30 days after Contract approval but before installing VIVDS equipment.

The documentation submittal must include:

1. Certificate of Compliance.
2. Site Analysis Report: Written analysis for each detection site, recommending the optimum video image sensor assembly placement approved by the manufacturer.
3. Lane Configuration: Shop drawing showing:
 - 3.1. Detection zone setback
 - 3.2. Detection zone size
 - 3.3. Camera elevation
 - 3.4. Selected lens viewing angle
 - 3.5. Illustration of detection zone mapping to reporting contact output
 - 3.6. Illustration of output connector pin or wire terminal for lane assignment.
4. Configuration Record: Windows PC compatible CD containing:
 - 4.1. Proposed zone designs
 - 4.2. Calibration settings
5. Mounting and Wiring Information: Manufacturer approved wiring video cable and service connection diagrams.
6. Communication Protocol: Industry standard available in public domain. Document defining:
 - 6.1. Message structure organization
 - 6.2. Data packet length
 - 6.3. Message usability
 - 6.4. Necessary information to operate a system from a remote windows based personal computer.
7. Programming Software: CD containing set up and calibration software that observes and detects the vehicular traffic, including bicycles, motorcycles, and sub-compact cars, with overlay of detection zones and allows adjustment of the detection sensitivity for a traffic signal application.
8. Detector Performance DVD Recordings and Analysis: Performance analysis based on 24-hour DVD recording of contiguous activity for each approach. Include:
 - 8.1. Two contiguous hours of sunny condition, with visible shadows projected a minimum of 6 feet into the adjacent lanes
 - 8.2. Two 1-hour night periods with vehicle headlights present.
9. Preventative Maintenance Parts Documentation: List of equipment replacement parts for preventative maintenance, including:
 - 9.1. Electrical parts, wiring and video cable
 - 9.2. Mechanical parts
 - 9.3. Assemblies.

Allow 7 days for the Engineer to review the documentation submittal.

If the Engineer requires revisions, submit a revised submittal within 5 days of receipt of the Engineer's comments and allow 5 days for the Engineer to review. If agreed to by the Engineer, revisions may be included as attachments in the resubmittal. The Engineer may conditionally approve, in writing, resubmittals that include revisions submitted as attachments, in order to allow construction activities to proceed.

Upon the Engineer's approval of the resubmittal, submit copies of the final documents (with approved revisions incorporated) to the Engineer.

Submit an acceptance testing schedule for approval 15 days before starting acceptance testing.

When beginning acceptance testing of VIVDS and detector performance and analysis, submit approved copies of the following:

1. Configuration Record: Windows PC compatible CD containing:

- 1.1. Final zone designs
- 1.2. Calibration settings to allow reinstallation.
2. Mounting and Wiring Information: Final wiring and service connection diagrams.
 - 2.1. One copy for the Engineer
 - 2.2. A second copy wrapped in clear self-adhesive plastic, be placed in a heavy duty plastic envelope, and secured to the inside of the cabinet door.

87-9.01D Quality Assurance

87-9.01D(1) General

VIVDS and support equipment required for acceptance testing must be new and as specified in the manufacturer's recommendations. Date of manufacture, as shown by date codes or serial numbers of electronic circuit assemblies, must not be older than 12 months from the scheduled installation start date. Material substitutions must not deviate from the material list approved by the Engineer.

87-9.01D(2) Training

You must provide a minimum of 16 hours of training by a factory authorized representative for a maximum of 8 Department employees. Submit training material to the Engineer for approval at least 30 days before the proposed training. Training material content must include instructions for aligning, programming, adjusting, calibrating, and maintaining VIVDS. You must provide all materials and equipment for the training. Notify the Engineer 20 days in advance of the proposed training to obtain approval of place and time of the training. If agreement cannot be reached, the Engineer will determine the time and place.

87-9.01D(3) Warranty

Furnish a 3-year replacement warranty from the manufacturer of VIS and VDU against defects in materials and workmanship or failures. The effective date of the warranty is the date of acceptance of the installation. Submit all warranty documentation before installation.

Replacement VIS and VDU must be furnished within 10 days of receipt of a failed unit. The Department does not pay for replacement.

Deliver replacement VIS and VDU to Caltrans Maintenance Electrical Shop at:

District 8 - Caltrans Electrical Maintenance Yard
175 West Cluster Street
San Bernardino, CA 92408

87-9.02 MATERIALS

87-9.02A General

VIVDS must include necessary firmware, hardware, and software for designing the detection patterns or zones at the intersection or approach. Detection zones must be created with a graphic user interface designed to allow to anyone trained in VIVDS system setup to configure and calibrate a lane in less than 15 minutes.

System elements must comply with the manufacturer's recommendations and be designed to operate continuously in an outdoor environment.

All equipment, cables, and hardware must be part of an engineered system that is designed by the manufacturer to fully interoperate with all other system components. Mounting assemblies must be corrosion resistant. Connectors installed outside the cabinets and enclosures must be corrosion resistant, weather proof, and watertight. Exposed cables must be sunlight and weather resistant.

87-9.02B Physical and Mechanical Requirements

VIVDS must include:

1. VIS and mounting hardware. Use a clamping device as mounting hardware on a pole or mast-arm.
2. VDU
3. Power supply
4. Surge suppression
5. Cables

6. Connectors
7. Wiring for connecting to the Department-furnished Model 332L traffic controller cabinet.
8. Communication card with multi-display port
9. Flat panel video display
10. DIN Rail mounted AC power assembly that includes a minimum of one convenience receptacle, four camera chassis ground connections, four camera AC neutral (AC-) connections, four 2 amp camera circuit breakers for hot (AC+) connections, and one AC source connection for Line, Neutral and Ground wires.
11. DIN Rail video surge suppression protection assembly that can accommodate up to six surge suppression modules

87-9.02C Electrical

VIVDS must operate between 90 to 135 V(ac) service as specified in NEMA TS-1. VIS, excluding the heater circuit, must draw less than 10 W of power. Power supply or transformer for the VIVDS must meet the following minimum requirements:

Minimum Requirements for Power Supply and Transformers		
Item	Power Supply	Transformer
Power Cord	Standard 120 V(ac), 3 prong cord, 3 feet minimum length (may be added by Contractor)	Standard 120 V(ac), 3 prong cord, 3 feet minimum length (may be added by Contractor)
Type	Switching mode type	Class 2
Rated Power	Two times (2x) full system load	Two times (2x) full system load
Operating Temperature	From -37 to 74 °C	From -37 to 74 °C
Operating Humidity Range	From 5 to 95 percent	From 5 to 95 percent
Input Voltage	From 90 to 135 V(ac)	From 90 to 135 V(ac)
Input Frequency	60 ± 3 Hz	60 ± 3 Hz
Inrush Current	Cold start, 25 A Max. at 115 V(ac)	N/A
Output Voltage	As required by VIVDS	As required by VIVDS
Overload Protection	From 105 to 150 percent in output pulsing mode	Power limited at >150 percent
Over Voltage Protection	From 115 to 135 percent of rated output voltage	N/A
Setup, Rise, Hold Up	800ms, 50ms, 15ms at 115 V(ac)	N/A
Withstand Voltage	I/P-0/P:3kV, I/P-FG:1.5kV, for 60 s.	I/P-0/P:3kV, I/P-FG:1.5kV, for 60 s
Working Temperature	Not to exceed 70 °C at 30 percent load	Not to exceed 70 °C at 30 percent load
Safety Standards	UL 1012, UL 60950	UL 1585

Field terminated circuits must include transient protection as specified in IEEE Standard 587-1980, Category C. Video connections must be isolated from ground.

87-9.02D Technical Requirements

Camera and zoom lens assembly must be housed in an environmentally sealed enclosure that complies with NEMA 4 standards. Enclosure must be watertight and protected from dust. Enclosure must include a thermostat controlled heater to prevent condensation and to ensure proper lens operation at low temperatures. Adjustable sun shield that diverts water from the camera's field of view must be included. Connectors, cables and wiring must be enclosed and protected from weather. A gas tight (protected from

dust and moisture ingress) connector must be used at the rear plate of the housing. Wiring to the connector must be sealed with silicone or potting compound.

Each camera and its mounting hardware must be less than 10 pounds and less than 1 square foot equivalent pressure area. Only one camera must be mounted on a traffic signal or luminaire arm. Top of camera must not be more than 12 inches above top of luminaire arm or 30 inches above top of traffic signal arm.

VIS must use a charge-coupled device (CCD) element, support National Television Standards Committee (NTSC) and RS170 video output formats, and have a horizontal resolution of at least 360 lines. VIS must include an auto gain control (AGC) circuit, have a minimum sensitivity to scene luminance from 0.01 to 930 foot-candle, and produce a usable video image of vehicular traffic under all roadway lighting conditions regardless of the time of day. VIS must have a motorized lens with variable focus and zoom control with an aperture of f/1.4 or better. Focal length must allow ± 50 percent adjustment of the viewed detection scene.

A flat panel video display with a minimum 17-inch screen and that supports NTSC video output must be enclosed in the Model 332L cabinet for viewing video detector images and for performing diagnostic testing. Display must be viewable in direct sunlight. Each VIVDS must have video system connections that support the NTSC video output format, can be seen in each camera's field of view, and has a program to allow the user to switch to any video signal at an intersection. A metal shelf or pull-out document tray with metal top capable of supporting the VDU and monitor must be furnished and placed on an EIA 19 inch rack with 10-32 "Universal Spacing" threaded holes in the Model 332L cabinet. System must allow independent viewing of a scene while video recording other scenes without interfering with the operation of the system's output.

Mounting hardware must be powder-coated aluminum, stainless steel, or treated to withstand 250 hours of salt fog exposure as specified in ASTM B 117 without any visible corrosion damage.

VDU must operate between -37 to $+74$ °C and from 0 to 95 percent relative humidity.

VDU front panel must have indicators for power, communication, presence of video input for each VIS, and a real time detector output operation. Hardware or software test switch must be included to allow the user to place either a constant or momentary call for each approach. Indicators must be visible in daylight from 5 feet away.

VDU must have a serial communication port, EIA 232/USB 2.0 that supports sensor unit setup, diagnostics, and operation from a local PC compatible laptop with Windows XP or later version operating system. VIVDS must have an Ethernet communication environment, including Ethernet communication card. VIVDS must include central and field software to support remote real-time viewing and diagnostics for operational capabilities through wide area network (WAN).

VDU, image processors, extension modules, and video output assemblies must be inserted into the controller input file slots using the edge connector to obtain limited 24 V(dc) power and to provide contact closure outputs. Cabling the output file to a "D" connector on the front of the VDU is acceptable. No rewiring to the standard Model 332L cabinet is allowed. Controller cabinet resident modules must comply with the requirements in Chapter 1 and Sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, 5.5.1, 5.5.5, and 5.5.6 of TEES.

87-9.02E Functional Requirements

VIVDS must support normal operation of existing detection zones while a zone is being added or modified. Zone must flash or change color on a viewing monitor when vehicular traffic is detected. Length and width of each detection zone for each lane must be approved by the Engineer.

Software and firmware must detect vehicular traffic presence, provide vehicle counts, set up detection zones, test VIVDS performance, and allow video scene and system operation viewing from the local traffic management center/office. VIVDS must support a minimum of 2 separate detection patterns or zones that can be enacted by a remote operator at the signal controller cabinet.

VIVDS detection zone must detect vehicles by providing an output for presence and pulse. At least one detection output must be provided for each detection zone. One spare detection output must be provided for each approach. Detection performance must be achieved for each detection zone with a maximum of 8 user-defined zones for every camera's field of view.

VIVDS must detect the presence of vehicles under all types of adverse weather and environmental conditions, including snow, hail, fog, dirt, dust or contaminant buildup on the lens or faceplate, minor camera motion due to winds, and vibration. Under low visibility conditions, the VIVDS must respond by selecting a fail-safe default pattern, placing a constant call mode for all approaches. VIVDS outputs must assume a fail-safe "on" or "call" pattern for presence detection if video signal or power is not available and must recover from a power failure by restoring normal operations within 3 minutes without manual intervention. If powered off for more than 90 days, system must maintain the configuration and calibration information in memory.

Detection algorithm must be designed to accommodate naturally occurring lighting and environment changes, specifically the slow moving shadows cast by buildings, trees, and other objects. These changes must not result in a false detection or mask a true detection. VIVDS must not require manual interventions for day-night transition or for reflections from poles, vehicles or pavement during rain and weather changes. VIVDS must suppress blooming effects from vehicle headlights and bright objects at night.

Vehicle detection must call service to a phase only if a demand exists and extend green service to the phase until the demand is taken care of or until the flow rates have reduced to levels for phase termination. VIVDS must detect the presence of vehicular traffic at the detection zone positions and provide the call contact outputs to the Model 170E or Model 2070L controller assembly with the following performance:

Detector Performance

Requirements	Performance during AMBER and RED interval	Performance during GREEN interval
Average response time after vehicle enters 3 feet into detection zone or after exiting 3 feet past detection zone	≤ 1 s	≤ 100 ms
Maximum number of MISSED CALLS in 24-hour duration, where MISSED CALLS are greater than 5 s during AMBER and RED intervals and greater than 1 s during GREEN intervals (upon entering 3 feet of detection zone or after exiting 3 feet past detection zone).	0	10
Maximum number of FALSE CALLS in 24-hour duration (calls greater than 500ms without a vehicle present)	20	20

VIVDS must be able to locally store, for each lane, vehicle count data in 5, 15, 30, and 60 minute intervals for a minimum period of 7 days and be remotely retrievable. VIVDS must count vehicular traffic in detection zone with a 95 percent accuracy or better for every hour counted over a morning or an evening peak hour. VIVDS detection zone tested must have a minimum range of 50 feet behind the limit line for each approach. Testing period will be pre-approved by the Engineer 48 hours in advance.

87-9.03C CONSTRUCTION

87-9.03C(a) General

Install VDU in existing Department-furnished Model 170E or Model 2070 controller assembly. Install VIS power supply or transformer on a standard DIN rail using standard mounting hardware and power conductors wired to DIN rail mounted terminal blocks in the controller cabinet. Each VIS must be connected to an individual circuit breaker in the DIN Rail mounted power assembly.

Wiring must be routed through end caps or existing holes and sealed. New holes for mounting or wiring must be shop-drilled.

Wire each VIS to the controller cabinet with a wiring harness that includes all power, control wiring, and coaxial video cable. Attach harness with standard MIL type and rated plugs. Cable type, connectors and wire characteristics must comply with manufacturer's recommendations for the VIS to cabinet distance. Wiring and cables must be continuous, without splices, between the VIS and controller cabinet. Coil a minimum of 7 feet of slack in the bottom of the controller cabinet. For setup and diagnostic access, terminate serial data communication output conductors at TB-0 and continue for a minimum of 10 feet to a DB9F connector. Tape ends of unused and spare conductors to prevent accidental contact to other circuits.

Label conductors inside the cabinet for the functions depicted the approved detailed diagrams. Label cables with permanent cable labels at each end.

Adjust the lens to view 110 percent of the largest detection area dimension. Zones or elements must be logically combined into reporting contact outputs that are equivalent to the detection loops and with the detection accuracy required.

Verify the performance of each unit, individually, and submit the recorded average and necessary material at the conclusion of the performance test. Determine and document the accuracy of each unit, individually, so that each unit may be approved or rejected separately. Failure to submit necessary material at the conclusion of testing invalidates the test. The recorded media serves as acceptance evidence and must not be used for calibration. Calibration must have been completed before testing and verification.

Verify the detection accuracy by observing the VIVDS performance and recorded video images for a contiguous 24-hour period. The recorded video images must show the viewed detection scene, the detector call operation, the signal phase status for each approach, the vehicular traffic count, and time-stamp to 1/100 of a second, all overlaid on the recorded video. Transfer the 24-hour analysis to DVD.

VIVDS must meet the detection acceptance criterion specified in table titled "Detector Performance."

Calculate the VIVDS's vehicular traffic count accuracy as $100[1-(|TC-DC|/TC)]$, where DC is the detector's vehicular traffic count and TC is the observed media-recorded vehicular traffic count and where the resulting fraction is expressed as an absolute value.

The Engineer will review the data findings and accept or reject the results within 7 days. Vehicle anomalies or unusual occurrences will be decided by the Engineer. Data or counts not agreed by the Engineer will be considered errors and count against the unit's calibration. If the Engineer determines that the VIVDS does not meet the performance requirements, you must re-calibrate and retest the unit, and resubmit new test data within 7 days. After 3 failed attempts, you must replace the VIVDS with a new unit.

Notify the Engineer 20 days before the unit is ready for acceptance testing. Acceptance testing must be scheduled to be completed before the end of a normal work shift. You must demonstrate that all VIS and VDUs satisfy the functional requirements.

Replace "RESERVED" section 87-10 with:
87-10 HIGH BANDWIDTH WIRELESS ETHERNET RADIO

87-10.01 GENERAL

87-10.01A Summary

Section 87-10 includes specifications for constructing high bandwidth wireless Ethernet radio (HBWER)

The HBWER is used for wireless communications between field elements and must provide a wireless Ethernet communication link to field elements.

87-10.01B Definitions

Not Used

87-10.01C Submittals

Submit the specifications of all cable assemblies, including connectors with strain relief back shells as part of the shop drawings for review and approval.

87-10.01D Quality Assurance

87-10.01D(1) General

Not Used

87-10.01D(2) Warranty

Furnish a 5 year replacement warranty from the manufacturer against any defects in materials or workmanship. The effective date of the warranty is the date of contract acceptance. Replacement parts must arrive within 5 business days after receipt of the failed parts. The Department does not pay for replacement parts. Deliver replacement parts to:

District 8 – Inland Empire TMC
13892 Victoria Street
Fontana, CA 92336

87-10.01D(3) Quality Control

87-10.01D(3)(a) General

87-10.01D(3)(b) Acceptance Testing

The Contractor must test all cables for continuity and shorts or grounds. Tests on cables with connectors attached (connectorized) must be performed after installation.

The Contractor must carry out system integration testing to ensure that the interfaces and all interconnect wiring and cabling perform to the specified standards when used in operation with all other devices installed under the contract.

87-10.02 MATERIALS

87-10.02A General

Not Used

Parameter	Specification
Frequency of Operation	5100 – 5900 MHz
Wireless Standard	802.11n MIMO (Multiple-Input Multiple-Output)
RF Data Rate	Support at least 300 Mbps
Ports	1 Ethernet
Integrated Antenna	Minimum 18 dBi
Receiver Sensitivity	Minimum -66dBm at 300Mbps
Data Encryption	WPA2
RF-Power	64mW (18 dBm) Minimum at 300 Mbps before Antenna
Ethernet	RJ-45, 10/100 BaseT IEEE 802.3 (or better)
Antenna Connector	Weather resistant connectors for external antennas-Optional with Integrated Antennas
Network Protocols	FTP, Multicast TCP, UDP, ARP, ICMP, DHCP, HTTP, SNMP, QOS, VLANs, STP, NTP Client, MAC Address Filtering, Port Blocking
Management	HTTP, HTTPS
Diagnostics	RSSI Remote diagnostics
Operating Modes	Point-to-Point, Point-to-Multipoint, Peer-to-Peer
Ethernet Interface	RJ-45, 10/100BaseT, IEEE 802.3 Ethernet compliant auto-sense, auto-negotiate (or better)
Operating Temperature	-30 to +670° C, IP66 Weather Rated
Input Voltage	POE or POE+

87-10.02B HBWER Antenna

87-10.02C Omni Directional Antenna

The HBWER radio as specified includes an integrated Directional antenna. If the selected HBWER radio has external antenna connectors, then an Omni Directional antenna may be used with the approval of the Engineer. The Omni Directional antenna must meet the following minimum requirements:

Parameter	Specification
Form Factor	60" maximum height
Beam Width	Omni Directional
Frequency	5150-5850 MHz MIMO (Multiple-Input and Multiple-Output)
VSWR	2:1 or Less
Power	90 Watts maximum
Gain	12dbi
Cross-pol Isolation	20 dbm minimum
Impedance	50 ohm
Polarization	Dual-Linear
Connecting Cables	(< 3') LMR 400 or better
Environmental	-30 to +670° C

87-10.02D Directional Antenna

The Directional Antenna must be integrated into HBWER assembly.

87-10.02E HBWER Interconnect Wiring

The HBWER interconnect wiring consists of CAT 5E cables and must be installed as shown on the plans, as specified in these special provisions and as recommended by the manufacturer.

All connectors must be in accordance with the manufacturer's recommendation. All connectors installed outside the enclosure must be weather proof and watertight. Weather proofing and water sealing must be included, provided and installed.

The Contractor must configure interconnect wiring and cabling at all locations shown on the project plans.

The antenna coaxial cables to be used for 5.7 GHz RF connections must be of 50 ohms impedance, low loss, flexible, rugged and UV resistant, and must have greater than 90 dB RF shielding. The coaxial cable must have a minimum bend radius of 1.6". Attenuation must not exceed 35.5 dB /100 m.

87-10.03 CONSTRUCTION

87-10.03A General

The installation of the HBWER must be according to the plans and the manufacturer's instructions.

Interconnect cabling and wiring must run continuous from the source to destination without splices.

Three feet of slack must be provided for equipment movement. All cabling must be secured and protected from physical damage.

Add to the end of section 87-21.03C for section 87:

Modifying a signal and lighting system includes removing, adjusting, or adding:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Cables
6. Standards
7. Signal heads
8. Internally illuminated street name signs
9. Service equipment enclosure
10. Department-furnished controller assembly
11. Detectors
12. Accessible pedestrian signals
13. Push button assemblies
14. Pedestrian signal heads
15. Luminaires
16. Photoelectric control
17. Fuse splice connectors
18. Battery backup system
19. VIVDS
20. HBWER

Modifying a traffic monitoring station includes removing, adjusting, or adding:

1. Foundations
2. Pull boxes
3. Conduit
4. Cables
5. Conductors
6. Controller cabinet
7. Detectors

Modifying a flashing beacon system includes removing, adjusting, or adding:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Standards
6. Service equipment enclosure
7. Signal heads
8. Flashing beacon control assembly

Add to the end of section 87-21.03D for section 87:

Removing a flashing beacon system includes removing:

1. Foundations
2. Conductors
3. Standards
4. Service equipment enclosure

**REVISED STANDARD SPECIFICATIONS
APPLICABLE TO THE 2018 EDITION
OF THE STANDARD SPECIFICATIONS**

REVISED STANDARD SPECIFICATIONS DATED 10-19-18

ORGANIZATION

Revised standard specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*. A date under a main-section heading is the date of the latest revision to the section.

Each revision to the *Standard Specifications* begins with a revision clause that describes or introduces a revision to the *Standard Specifications*. For a revision clause that describes a revision, the date on the right above the clause is the publication date of the revision. For a revision clause that introduces a revision, the date on the right above a revised term, phrase, clause, paragraph, or section is the publication date of the revised term, phrase, clause, paragraph, or section. For a multiple-paragraph or multiple-section revision, the date on the right above a paragraph or section is the publication date of the paragraphs or sections that follow.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

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DIVISION I GENERAL PROVISIONS

1 GENERAL

10-19-18

Add between the 1st and 2nd paragraphs of section 1-1.01:

10-19-18

Global revisions are changes to contract documents not specific to a section of the Standard Specifications. In each contract document at each occurrence, interpret the following terms as shown:

Term	Interpretation	Conditions
Fed-Std-595	AMS Std 595	--

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2 BIDDING

10-19-18

Replace the 5th paragraph of section 2-1.12B(1) with:

10-19-18

You are responsible to verify at bid opening the DBE firm is certified as a DBE by the California Unified Certification Program and possesses the most specific available NAICS codes or work codes applicable to the type of work the firm will perform on the Contract.

Replace section 2-1.12B(2) with:

10-19-18

2-1.12B(2) DBE Commitment Submittal

Submit DBE information under section 2-1.33.

Submit a copy of the quote from each DBE shown on the DBE Commitment form that describes the type and dollar amount of work shown on the form no later than 4 p.m. on the 5th day after bid opening. If the last day for submitting the quote falls on a Saturday or holiday, it may be submitted on the next business day with the same effect as if it had been submitted on the 5th day.

Submit a DBE Confirmation form for each DBE shown on the DBE Commitment form to establish that it will be participating in the Contract in the type and dollar amount of work shown on the form. If a DBE is participating as a joint venture partner, submit a copy of the joint venture agreement.

Failure to submit a completed DBE Confirmation form and a copy of the quote from each DBE will result in disallowance of the DBE's participation.

Add between the 4th and 5th paragraphs of section 2-1.15B:

10-19-18

Submit a copy of the quote from each DVBE listed on the Certified DVBE Summary form that describes the type and dollar amount of work shown on the form no later than 4 p.m. on the 4th business day after bid opening.

Add between the 3rd and 4th paragraphs of section 2-1.15C(1):

10-19-18

Submit a copy of the quote from each DVBE listed on the Certified DVBE Summary form that describes the type and dollar amount of work shown on the form no later than 4 p.m. on the 4th business day after bid opening.

Add between the 1st and 2nd paragraphs of section 2-1.18C:

10-19-18

Failure to submit a completed Certified Small Business Listing for the Non-Small Business Preference form by 4 p.m. on the 2nd business day after bid opening will result in a nonresponsive bid.

Replace section 2-1.33B with:

10-19-18

2-1.33B Bid Form Submittal Schedules

2-1.33B(1) General

The *Bid* book includes forms specific to the Contract. The deadlines for the submittal of the forms vary depending on the requirements of each Contract. Determine the requirements of the Contract and submit the forms based on the applicable schedule specified in section 2-1.33B.

Bid forms and information on the form that are due after the time of bid may be submitted at the time of bid.

2-1.33B(2) Federal-Aid Contracts

2-1.33B(2)(a) General

Section 2-1.33B(2) applies to a federal-aid contract.

2-1.33B(2)(b) Contracts with a DBE Goal

2-1.33B(2)(b)(i) General

Section 2-1.33B(2)(b) applies if a DBE goal is shown on the *Notice to Bidders*.

2-1.33B(2)(b)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Federal-Aid Contract with a DBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number
Copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid except for the public works contractor registration number
Copy of the Subcontractor List as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Small Business Status	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid
DBE Commitment	No later than 4 p.m. on the 5th day after bid opening ^b
DBE Confirmation	No later than 4 p.m. on the 5th day after bid opening ^b
DBE Good Faith Efforts Documentation	No later than 4 p.m. on the 5th day after bid opening ^b

^aSubmit only if you choose the option.

^bIf the last day for submitting the bid form falls on a Saturday or holiday, it may be submitted on the next business day with the same effect as if it had been submitted on the day specified.

2-1.33B(2)(b)(iii) Reserved**2-1.33B(2)(c) Contracts without a DBE Goal****2-1.33B(2)(c)(i) General**

Section 2-1.33B(2)(c) applies if a DBE goal is not shown on the *Notice to Bidders*.

2-1.33B(2)(c)(ii) Bid Form Schedule

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Federal-Aid Contract without a DBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number
Copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid except for the public works contractor registration number
Copy of the Subcontractor List as submitted at the time of bid with the public works contractor registration numbers	10 days after bid opening
Small Business Status	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid

^aSubmit only if you choose the option.

2-1.33B(2)(c)(iii) Reserved**2-1.33B(2)(d)–2-1.33B(2)(h) Reserved****2-1.33B(3) Non-Federal-Aid Contracts****2-1.33B(3)(a) General**

Section 2-1.33B(3) applies to non-federal-aid contracts.

2-1.33B(3)(b) Contracts with a DVBE Goal**2-1.33B(3)(b)(i) General**

Section 2-1.33B(3)(b) applies if a DVBE goal is shown on the *Notice to Bidders*.

2-1.33B(3)(b)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Non-Federal-Aid Contract with a DVBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number for a joint-venture contract
For a joint-venture contract, copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid
Certified DVBE Summary	No later than 4 p.m. on the 4th business day after bid opening
California Company Preference	Time of bid
Request for Small Business Preference or Non–Small Business Preference ^a	Time of bid
Certified Small Business Listing for the Non–Small Business Preference ^a	No later than 4 p.m. on the 2nd business day after bid opening

^aSubmit only if you choose the option or preference.

2-1.33B(3)(b)(iii) Reserved**2-1.33B(3)(c) Contracts without a DVBE Goal****2-1.33B(3)(c)(i) General**

Section 2-1.33B(3)(c) applies if a DVBE goal is not shown on the *Notice to Bidders*.

2-1.33B(3)(c)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Non-Federal-Aid Contract without a DVBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number for a joint-venture contract
For a joint-venture contract, copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid
California Company Preference	Time of bid
Certified DVBE Summary ^b	No later than 4 p.m. on the 4th business day after bid opening
Request for Small Business Preference or Non-Small Business Preference ^a	Time of bid
Certified Small Business Listing for the Non-Small Business Preference ^a	No later than 4 p.m. on the 2nd business day after bid opening

^aSubmit only if you choose the option or preference.

^bSubmit only if you obtain DVBE participation or you are the apparent low bidder, 2nd low bidder, or 3rd low bidder and you choose to receive the specified incentive.

2-1.33B(3)(c)(iii) Reserved

2-1.33B(3)(d)–2-1.33B(3)(h) Reserved

2-1.33B(4)–2-1.33B(9) Reserved

AA

5 CONTROL OF WORK

10-19-18

Replace the 6th paragraph of section 5-1.13B(2) with:

10-19-18

If the Department authorizes the termination or substitution of a listed DBE, make good faith efforts to find another DBE. The substitute DBE must (1) perform at least the same dollar amount of work as the original DBE under the Contract to the extent needed to meet the DBE goal and (2) be certified as a DBE with the most specific available NAICS or work code applicable to the type of work the DBE will perform on the Contract at the time of your request for substitution. Submit your documentation of good faith efforts within 7 days of your request for authorization of the substitution. The Department may authorize a 7-day extension of this submittal period at your request. Refer to 49 CFR 26 app A for guidance regarding evaluation of good faith efforts to meet the DBE goal.

Replace the 2nd sentence in the 2nd paragraph of section 5-1.13C with:

10-19-18

The substitute must be another DVBE, unless DVBEs are not available. The substitute must perform the work originally stated.

Replace the 6th paragraph of section 5-1.13C with:

10-19-18

If a DVBE substitute is not available, requests for substitutions of a listed DVBE must include:

1. Contact with the DVBE advocate from the Department and the Department of Veteran Affairs

2. Search results from the Department of General Services' website of available DVBEs
3. Communication with a DVBE community organization nearest the job site, if applicable
4. Documented communication with DVBEs describing the work to be performed, the percentage of the total bid, the corresponding dollar amount, and the responses to the communication

Replace section 5-1.24 with:

10-19-18

5-1.24 CONSTRUCTION SURVEYS

5-1.24A General

The Department places stakes and marks under chapter 12, "Construction Surveys," of the Department's *Surveys Manual*.

Submit your request for Department-furnished stakes:

1. Once staking area is ready for stakes
2. On a Request for Construction Staking form

After your submittal, the Department starts staking within 2 business days.

Preserve stakes and marks placed by the Department. If the stakes or marks are destroyed, the Department replaces them at the Department's earliest convenience and deducts the cost.

Replace section 5-1.26 with:

10-19-18

5-1.26 RESERVED

Replace item 1.2 in the list in the 1st paragraph of section 5-1.43E(2)(b) with:

10-19-18

- 1.2. Have completed training by the Department

Replace item 1.2 in the list in the 1st paragraph of section 5-1.43E(3)(b) with:

10-19-18

- 1.2. Have completed training by the Department

AA

6 CONTROL OF MATERIALS

10-19-18

Replace section 6-1.03 with:

10-19-18

6-1.03 LOCAL MATERIALS

Local material must be rock, sand, gravel, earth, or mineral material other than local borrow, or selected material obtained or produced from a source in the work vicinity, specifically for use on the project. Local borrow must not be a material from an established commercial source.

Upon your request, the Department tests material for quality characteristics from an untested local source. If satisfactory material from that source is used in the work, the Department does not charge you for the tests; otherwise, the Department deducts the test costs.

AA

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

10-19-18

Replace the 1st sentence in the 5th paragraph of section 7-1.02K(6)(a) with:

10-19-18

Submit copies of your Injury and Illness Prevention Program, Code of Safe Practices, and permits required by Cal/OSHA as informational submittals.

AA

8 PROSECUTION AND PROGRESS

10-19-18

Replace the row for **Safety** in the table in the 2nd paragraph of section 8-1.03 with:

10-19-18

Safety	Injury and Illness Prevention Program, Code of Safe Practices, and job site posters
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AA

9 PAYMENT

10-19-18

Replace section 9-1.07B(5) with:

10-19-18

9-1.07B(5) Hot Mix Asphalt Containing Reclaimed Asphalt Pavement

The Engineer calculates the quantity of asphalt in HMA containing RAP using the following formula:

$$Q_{rap} = HMARTT \times X_{aa}$$

where:

$$X_{aa} = X_{ta} - [(X_{rap} \times X_{ra} \times (X_{ta} - 100)) / (100 \times (X_{ra} - 100))]$$

and:

Q_{rap} = quantity in tons of asphalt used in HMA containing RAP

$HMARTT$ = HMA containing RAP, total tons placed

X_{aa} = asphalt content of HMA containing RAP adjusted to exclude the asphalt content in RAP, expressed as a percentage of the total weight of HMA containing RAP

X_{ta} = total theoretical asphalt content in HMA containing RAP from the job mix formula, expressed as a percentage of the total weight of HMA containing RAP

X_{rap} = RAP percentage in HMA containing RAP from the job mix formula, expressed as a percentage of the total dry weight of aggregate in HMA containing RAP

X_{ra} = average asphalt content of RAP from the job mix formula, expressed as percentage of total weight of RAP

10-19-18

A material on hand but not incorporated into the work is eligible for a progress payment if:

- [illegible]

10-19-18

10-19-18

Replace the 3rd paragraph of section 12-4.02C(2)(a) with:

10-19-18

Replace the list in the 1st paragraph of section 12-4.02C(7)(d) with:

10-19-18

- [illegible]

DIVISION III EARTHWORK AND LANDSCAPE

19 EARTHWORK

10-19-18

Replace the 1st paragraph of section 19-3.03E(1) with:

10-19-18

Place structure backfill in uniform layers. Bring backfill up uniformly on all sides of structures or drainage facilities. Backfill layer thickness must not exceed 0.67 foot before compacting. If you perform compaction by ponding and jetting, the thickness of the backfill layer must not exceed 4 feet.

Replace the 1st sentence in the 3rd paragraph of section 19-3.03E(1) with:

10-19-18

Do not place structure backfill until footings or other parts of structures or drainage facilities are authorized.

AA

20 LANDSCAPE

10-19-18

Replace the 2nd paragraph of section 20-2.01A(4)(d) with:

10-19-18

In the presence of the Engineer, perform a functional test for each system that demonstrates:

1. Components of the system are functioning and integrated with one another.
2. Controller programming is complete including external weather and other system data inputs that are required to operate the system in automatic mode.
3. Watering schedule is appropriate for the plants, current weather, season, and site conditions.
4. System has complete sprinkler coverage of the site.

Perform the test for each system:

1. Before planting the plants
2. After irrigation system repair work
3. Annually during plant establishment work
4. Not more than 30 days prior to contract acceptance
5. When ordered

10-19-18

Delete section 20-2.01A(4)(e).

Replace the 1st paragraph of section 20-2.01B(5) with:

10-19-18

Pull boxes must comply with section 86-1.02C and be no. 5 or larger. Pull boxes for low voltage conductors must not have side openings.

Replace the 1st paragraph of section 20-2.01C(2) with:

10-19-18

Perform trenching and backfilling under section 87-1.03E(2).

Replace the introductory clause to the list in the 1st paragraph of section 20-2.01C(3) with:

10-19-18

Install pull boxes under section 87-1.03C at the following locations:

Replace the 1st paragraph of section 20-2.04A(4) with:

10-19-18

Perform field tests on control and neutral conductors. Field tests must comply with the specifications in section 87-1.01D(2)(a).

Replace the 1st and 2nd paragraphs of section 20-2.04B with:

10-19-18

Control and neutral conductors must comply with the provisions for conductors and cables in section 86-1.02F.

Electrical conduit and fittings must comply with section 86-1.02(B).

Replace the 1st paragraph of section 20-2.04C(4) with:

10-19-18

Splice low voltage control and neutral conductors under section 87-1.03H except do not use Method B. Tape used for splice insulation must be PVC tape.

Replace the introductory clause of the 1st paragraph of section 20-2.06B(3) with:

10-19-18

The irrigation controller enclosure cabinet must comply with section 86-1.02Q and must:

Add to the beginning of section 20-2.06C:

10-19-18

Install the irrigation controller enclosure cabinet under 87-1.03Q(1).

Replace the table in the 3rd paragraph of section 20-3.01B(2)(a) with:

10-19-18

Plant group designation	Description	Container size (cu in)
A	No. 1 container	152–251
B	No. 5 container	785–1242
C	Balled and burlapped	--
E	Bulb	--
F	In flats	--
H	Cutting	--
I	Pot	--
K	24-inch box	5775–6861
M	Liner ^a	--
O	Acorn	--
P	Plugs ^{a, b}	--
S	Seedling ^c	--
U	No. 15 container	2768–3696
Z	Palm Tree	--

^aDo not use containers made of biodegradable material.

^bGrown in individual container cells.

^cBare root.

Replace the introductory clause of the 1st paragraph of section 20-3.01B(4)(b) with:

10-19-18

Slow-release fertilizer must be a pelleted or granular form with a nutrient release over a 3 to 4 month period and be within the chemical analysis ranges shown in the following table:

Replace section 20-3.01C(3) with:

10-19-18

Water plants as needed to keep the plants in a healthy growing condition.

Replace the 1st paragraph of section 20-4.03G with:

10-19-18

Operate the electric automatic irrigation systems, including external weather and other system data inputs required to operate the system in automatic mode, unless otherwise authorized.

10-19-18

Delete the 3rd paragraph of section 20-4.03G.

Add to the end of section 20-5.03B(3):

10-19-18

If you are ordered to remove existing concrete below ground within the limits of the rock blanket, saw cut the concrete before removal. This work is change order work.

Replace item 1 in the list in the 1st paragraph of section 20-10.03A(3) with:

10-19-18

1. Transplanting trees. The work plan must include methods of lifting, transporting, storing, planting, guying, watering and maintaining each tree to be transplanted. Include the root ball size, method of root ball containment, and a maintenance program for each tree.

10-19-18

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Delete the 3rd paragraph of section 46-1.03B.

Replace the 1st sentence in the 2nd paragraph of section 46-2.02B with:

10-19-18

The anchorage enclosure and the steel tube and bearing plate of the anchorage assembly must be galvanized steel and comply with sections 55-1.02D(1) and 55-1.02E(1).

Replace item 9 in the list in the 3rd paragraph of section 46-2.02D with:

10-19-18

9. Have the physical properties shown in Table 4.1 of *Recommendations for Prestressed Rock and Soil Anchors* published by the Post-Tensioning Institute

Replace the 4th paragraph of section 46-2.03D with:

10-19-18

Immediately after lock-off, perform a lift-off test to verify that the lock-off load has been attained. The lift-off load must be within 10 percent of the specified lock-off load. If necessary adjust the shim thickness to achieve the lock-off load. If the load is not within 10 percent of the specified lock-off load, the anchorage must be reset and another lift-off load reading must be made. Repeat the process until the specified lock-off load is obtained.

Replace the 2nd paragraph of section 46-3.01A with:

10-19-18

A soil nail consists of a solid steel bar with an anchorage assembly that is placed in a drilled hole and then grouted.

Replace section 46-3.01D(2)(b)(ii)(1) with:

10-19-18

46-3.01D(2)(b)(ii)(1) General

Determine the test load using the following equation:

$$T = L_b \times Q_b$$

where:

T = test load, pounds

L_b = soil nail bonded length, feet, 10 feet minimum

Q_b = test load per unit length of bond, pounds/foot

Replace section 46-3.02A with:

10-19-18

46-3.02A General

Each production soil nail must be either a solid steel bar encapsulated full length in a grouted corrugated plastic sheathing or an epoxy-coated prefabricated solid steel bar partially encapsulated in a grouted corrugated plastic sheathing as shown.

Epoxy-coated prefabricated steel bars must comply with the specifications for epoxy-coated prefabricated reinforcement in section 52-2.03, except the average coating thickness after curing must be from 10 to 15 mils.

Solid steel bar for test soil nails is not required to be epoxy coated or encapsulated in grouted plastic sheathing.

Replace the heading of section 46-3.02B with:

10-19-18

Anchorage Assemblies

Replace section 46-3.02C with:

10-19-18

46-3.02C Solid Steel Bars

Solid steel bars must be either:

1. Threaded bars with spirally-deformed, ribbed threads continuous along the entire length of the bar.
2. Deformed reinforcing bars with at least a 6-inch length of thread cut into the bar on the anchorage end. Use coarse threading and the next larger reinforcing bar size.

Solid steel bars must comply with ASTM A615/A615M or A706/A706M, Grade 60 or ASTM A615/A615M, Grade 75.

Splicing must be authorized.

Epoxy coating at the anchorage end of epoxy-coated bars may be omitted for a maximum of 6 inches. Metal surfaces of assembled splices of epoxy-coated bars must be epoxy coated.

Choose the solid steel bar size and grade for test soil nails. Test soil nail bars must not be smaller than the production soil nails they represent.

Replace the 1st paragraph of section 46-3.03A with:

10-19-18

Determine the drilled-hole diameter and installation method required to achieve the test load per unit length of bond values shown.

Replace the introductory clause to the list in the 3rd paragraph of section 46-3.03B with:

10-19-18

Install verification test soil nails by any of the following means:

Replace the 7th and 8th paragraphs of section 46-3.03B with:

10-19-18

Remove each verification and proof test soil nail to 6 inches behind the front face of the shotcrete after testing is complete. Fill the voids with grout.

If ordered, extract verification and proof test soil nails selected by the Engineer. Fill the voids with grout. Photograph the extracted test nails in 5-foot section intervals.

Replace the 3rd paragraph of section 46-3.03C with:

10-19-18

Splice the solid steel bar only where shown on the authorized shop drawings or at the end of a soil nail that is ordered to be lengthened.

Replace the 1st sentence in the 7th paragraph of section 46-3.03C with:

10-19-18

Hand tighten the nut on the end of the production soil nail bar before shotcrete hardening begins. Ensure the bearing plate is fully seated on the shotcrete.

AA

48 TEMPORARY STRUCTURES

10-19-18

Add to the end of section 48-1.01:

10-19-18

Falsework, temporary supports and jacking support systems must comply with any additional requirements of the railroad company involved.

Add to section 48-2.01B:

10-19-18

Falsework release: Lowering of falsework to the point that it no longer supports the loads imposed by the permanent structure, or any element, that the falsework was designed to support during construction.

Falsework removal: Releasing, lowering, and disposing of the falsework.

10-19-18

Delete the 7th paragraph of section 48-2.01C(2).

Replace the 4th paragraph of section 48-2.02B(2) with:

10-19-18

The assumed horizontal load the falsework bracing system must resist must be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and a wind loading. The assumed horizontal load in any direction must be at least 2 percent of the total dead load.

Replace the table in the 2nd paragraph of section 48-2.02B(3)(b) with:

10-19-18

Quality characteristic	Requirement
Compression perpendicular to the grain (psi)	450
Compression parallel to the grain (psi)	$480,000/(L/d)^2$; 1,600 maximum
Flexural stress	1,800 psi; 1,500 psi maximum for members with a nominal depth of 8 inches or less.
Horizontal shear (psi)	140
Axial tension (psi)	1,200
Deflection due to concrete loading only	1/240 of span length
Modulus of elasticity (E) (psi)	1.6×10^6
Timber piles (tons)	45

NOTES:

L = unsupported length, inches

d = least dimension of a square or rectangular column or the width of a square of equivalent cross-sectional area for round columns, inches

Replace the table in the 3rd paragraph of section 48-2.02B(3)(c) with:

10-19-18

Quality characteristic	Requirement
Compression, flexural (psi)	$12,000,000/[(L \times d)/(b \times t)]^a$
Deflection due to concrete loading only	1/240 of the span
Modulus of elasticity (E) (psi)	30×10^6

NOTES:

L = unsupported length, inches

d = least dimension of rectangular columns or the width of a square of equivalent cross-sectional area for round columns, or the depth of beams, inches

b = width of the compression flange, inches

t = thickness of the compression flange, inches

F_y = specified minimum yield stress in psi

^aNot to exceed (1) 22,000 psi for unidentified steel, (2) 22,000 psi for steel complying with ASTM A36/A36M, or (3) $0.6F_y$ for other identified steel

Add to section 48-2.02:

10-19-18

48-2.02C Falsework Lighting

48-2.02C(1) General

Reserved

48-2.02C(2) Pavement Illumination

Pavement illumination fixture must:

1. Have commercial-type flood lamp holder with protective covers.
2. Be fully adjustable with brackets and locking screws.
3. Mount directly to a standard metal junction box.
4. Have a medium-base PAR-38 quartz-halogen flood lamp or an equivalent energy efficient alternative emitting 1,700 to 2,200 lumens with a correlated color temperature of 3,000 kelvin or less.

48-2.02C(3) Portal Illumination

Portal illumination includes plywood sheet clearance guides 4 feet wide by 8 feet high and fixtures with a PAR reflector floodlamp or equivalent energy efficient alternatives emitting 1,500 to 1,700 lumens with a correlated color temperature of 3,000 kelvin or less.

48-2.02C(4) Pedestrian Walkway Illumination

Pedestrian walkway illumination fixtures must be the flush mounted type equipped with a damage-resistant, clear, polycarbonate diffuser lens, an overhead protection shield, and a standard incandescent lamp or equivalent energy efficient alternatives emitting 1,500 to 2,000 lumens with a correlated color temperature of 3,000 kelvin or less.

Add to section 48-2.03A:

10-19-18

Traffic must be detoured, from the lanes over which falsework is being erected, released, or removed.

Replace the 3rd paragraph of section 48-2.03B with:

10-19-18

Falsework piles must be driven and assessed under section 49. The actual nominal pile resistance must be at least twice the falsework pile design load. For pile acceptance, the required number of hammer blows in the last foot of driving is determined using the formula in 49-2.01A(4)(c).

Add between the 2nd and 3rd paragraphs of section 48-2.03C:

10-19-18

Falsework erection includes adjustments or removal of components that contribute to the horizontal stability of the falsework system.

Replace section 48-2.03D with:

10-19-18

48-2.03D Removal

Remove falsework such that portions of falsework not yet removed remain stable at all times.

Falsework release includes blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Except for concrete above the deck, do not release falsework supporting any span of a:

1. Simple span bridge before 10 days after the last concrete has been placed
2. Continuous or rigid frame bridge before 10 days after the last concrete has been placed:
 - 2.1. In that span
 - 2.2. In adjacent portions of each adjoining span for a length equal to one-half of the span where falsework is to be released
3. Simple span, continuous, or rigid frame bridge until the supported concrete has attained a compressive strength of 2,880 psi or 80 percent of the specified strength, whichever is greater

Do not release falsework for prestressed portions of structures until prestressing steel has been tensioned.

Do not release falsework supporting any span of a continuous or rigid frame bridge until all required prestressing is complete (1) in that span and (2) in adjacent portions of each adjoining span for a length equal to at least one half of the span where falsework is to be released.

Release falsework supporting spans of CIP girders, slab bridges, or culverts before constructing or installing railings or barriers on the spans unless authorized.

Release falsework for arch bridges uniformly and gradually. Start at the crown and work toward the springing. Release falsework for adjacent arch spans concurrently.

Do not release falsework that supports overhangs, deck slabs between girders, or girder stems that slope 45 degrees or more from vertical before 7 days after deck concrete has been placed.

You may release falsework supporting the sides of girder stems that slope less than 45 degrees from vertical before placing deck concrete if you install lateral supports. Lateral supports must be:

1. Designed to resist rotational forces on the girder stem, including forces due to concrete deck placement
2. Installed immediately after each form panel is removed
3. Installed before releasing supports for the adjacent form panel

Do not release falsework for bent caps supporting steel or PC concrete girders before 7 days after placing bent cap concrete.

Release falsework for structural members subject to bending as specified for simple span bridges.

Do not release falsework for box culverts and other structures with decks lower than the roadway pavement and span lengths of 14 feet or less until the last placed concrete has attained a compressive strength of 1,600 psi. Curing of the concrete must not be interrupted. Falsework release for other box culverts must comply with the specifications for the release of bridge falsework.

Do not release falsework for arch culverts sooner than 40 hours after concrete has been placed.

Remove falsework piling to at least 2 feet below the original ground or streambed. Remove falsework piling driven within ditch or channel excavation limits to at least 2 feet below the bottom and side slopes of the excavated areas.

Dispose of falsework materials and work debris.

Falsework removal systems employing methods of holding falsework by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must also be supported by an independent support system when the falsework removal system is not actively lowering the falsework at vehicular, pedestrian, or railroad traffic openings.

Bridge deck openings used to facilitate falsework removal activities must be formed with a 6-inch maximum diameter opening. The opening must be located away from the wheel paths.

Clean and roughen openings made in the bridge deck. Fill the deck openings with rapid setting concrete complying with section 60-3.02B(2).

Bridge soffit openings used to facilitate falsework removal activities must be formed with a 5-inch maximum diameter.

Anchor 10-inch-square aluminum or galvanized steel wire, 1/4-inch-mesh hardware cloth with a 0.025-inch minimum wire diameter firmly to the inside of the soffit openings. Construct a 1/2-inch drip groove to the outside of soffit openings.

Falsework removal over roadways with a vertical traffic opening of less than 20 feet must start within 14 days after the falsework is eligible to be released and must be completed within 45 days after it is eligible to be released.

Replace section 48-2.03E with:

10-19-18

48-2.03E Falsework Lighting

48-2.03E(1) General

Provide lighting to illuminate the pavement, portals, and pedestrian walkways at or under openings in the falsework required for traffic.

Install lighting for pedestrian walkway illumination at all pedestrian openings through or under the falsework.

Design falsework lighting such that required maintenance can be performed with a minimum of inconvenience to traffic. Closing of traffic lanes for routine maintenance is not allowed on roadways with posted speed limits greater than 25 mph.

During the hours of darkness, illuminate:

1. Falsework portals
2. Pavement under falsework with portals less than 150 feet apart

Use photoelectric switches to control falsework lighting systems. Pavement under falsework with portals 150 feet or more apart and all pedestrian openings through falsework must be illuminated 24 hours per day.

Aim the lighting fixtures to avoid glare to motorists.

Fasten a Type NMC cable with no. 12 minimum conductors with ground wire to the supporting structure at sufficient intervals to adequately support the cable and within 12 inches from every box or fitting. Use 1/2-inch or larger Type 1 conduit for conductors within 8 feet of ground.

Provide a maximum 20 A fuse for each branch circuit for illumination systems at each bridge location.

Arrange with the service utility to complete service connections for falsework lighting. You pay for energy, line extension, service, and service hookup costs.

48-2.03E(2) Pavement Illumination

Install a continuous row of fixtures beneath falsework structure with the end fixtures not further than 10 feet inside portal faces. Energize the fixtures immediately after the members supporting them have been erected.

Place the fixtures along the sides of the opening not more than 4 feet behind or 2 feet in front of the roadway face of the temporary railing. Mount the fixtures from 12 to 16 feet above the roadway surface without obstructing the light pattern on the pavement.

48-2.03E(3) Portal Illumination

Provide falsework portal illumination on the side facing traffic. Mount fixtures on the structure directly over each vertical support adjacent to the traveled way, as needed, to uniformly illuminate the exterior falsework beam, the clearance guides, and the overhead clearance sign. Each fixture must be supported approximately 16 feet above the pavement and 6 feet in front of the portal face.

Portal illumination clearance guides must:

1. Be fastened vertically, facing traffic, with the bottom of the panel from 3 to 4 feet above the roadway
2. Have the center of the panel located approximately 3 feet horizontally behind the roadway face of the railing
3. Be freshly painted panels for each installation with not less than 2 applications of flat white paint.

Paint testing of painted panels not required.

Portal lighting and clearance guides must be installed on the day the vertical members are erected.

If ordered, repaint the designated areas to improve the general appearance of the painted surfaces. Repainting is change order work.

48-2.03E(4) Pedestrian Walkway Illumination

Provide pedestrian walkway illumination immediately after the overhead protection shield is erected.

Flush mount the fixtures in the overhead protection shield and center them over the passageway at intervals of not more than 15 feet with the end fixtures not more than 7 feet inside the end of the pedestrian openings.

10-19-18

Delete the 4th paragraph of section 48-3.01C(2).

Add between the 9th and 10th paragraphs of section 48-3.02B:

10-19-18

For bridge removal, the temporary support system must resist the design loads and forces shown. As a minimum, the horizontal load to be resisted in any direction for temporary support shoring and temporary bracing must be (1) the sum of actual horizontal loads due to equipment, construction sequence, or other causes plus an allowance for wind and (2) not less than 5 percent of the total dead load of the structure being removed.

10-19-18

Delete the 2nd and 3rd paragraphs of section 48-4.01A.

Replace section 48-4.01C with:

10-19-18

48-4.01C Submittals

Submit shop drawings for temporary decking. Include the following:

1. Description, location, and value of all loads if temporary decking is not shown

2. Details of the connection between the temporary decking and the existing or new structure if temporary decking is not shown
3. Storage location of equipment and materials that allows for 1 shift of work and placement of temporary decking within the time allowed
4. Construction sequence and schedule details
5. Cure time for concrete to be placed under a steel plate system
6. Details for removing temporary decking and restoring the existing structure

If temporary decking is not shown, shop drawings must be signed by an engineer who is registered as a civil engineer in the State.

Replace section 48-4.01D with:

10-19-18

48-4.01D Quality Assurance

If temporary decking is not shown, the temporary decking design must comply with:

1. The unfactored permit loads, braking force, and HL93 loads except lane load from *AASHTO LRFD Bridge Specifications with California Amendments*.
2. Section 48-2.02B(3)
3. Live load deflection must not exceed 1/300 of the temporary decking span for the design load.
4. Temporary decking must have a uniform surface with a coefficient of friction of at least 0.35 when measured under California Test 342.
5. Steel plate systems must be mechanically connected to the existing structure and adjacent approaches. If a steel plate spans a joint, the mechanical connection must accommodate at least 50 percent of the movement rating shown for that joint.
6. Must not overstress, induce permanent forces into, or produce cracking in the existing structure.

Replace section 48-4.03 with:

10-19-18

48-4.03 CONSTRUCTION

Temporary decking must consist of one of the following:

1. Steel plate system that spans the incomplete work.
2. Falsework with an asphalt concrete surface that spans the incomplete work. Do not use falsework with an asphalt concrete surface to cover deck concrete that has not cured or to cover partially installed joint materials.

Construct temporary decking under the specifications for falsework in section 48-2 except the first paragraph of section 48-2.03D does not apply.

If there is an elevation difference of more than 1/2 inch between the temporary decking and the adjacent deck, install temporary tapers up to and away from the temporary decking. Construct tapers under section 7-1.03. If the temporary decking does not extend the entire width of the roadway, taper the sides of the temporary decking at a 12:1 (horizontal: vertical) ratio.

Material for temporary tapers must comply with section 60-3.02B(2) or 60-3.04B(2). Cure temporary tapers at least 3 hours before allowing traffic on the temporary decking.

If unanticipated displacements, cracking, or other damage occurs to the existing structure or to any new components installed in or adjacent to the deck, stop work on the deck and perform corrective measures.

Edges of steel plate systems must be in full contact with the existing deck and the adjacent approach slab. If used, shims must be securely attached to the plate.

For falsework with an asphalt concrete cover, asphalt concrete must be at least 3 inches thick and compacted in place.

Do not allow traffic on deck concrete until it has attained the design compressive strength shown.

When temporary decking is no longer needed, remove temporary decking materials and connections from the existing structure as soon as possible. Remove modifications to the existing structure except where permanent alterations are shown.

10-19-18

Delete the 4th paragraph of section 48-5.01C.

Replace the 1st paragraph of section 48-5.02B with:

10-19-18

The jacking support system must resist the structure dead load and lateral design forces shown, plus any additional loads from jacking equipment and activities. As a minimum, the horizontal load to be resisted in any direction for the jacking support system and temporary bracing must be (1) the sum of actual horizontal loads due to equipment, construction sequence, or other causes plus an allowance for wind as specified in Section 48-2.02B(2) and (2) not less than 2 percent of the total dead load of the structure being jacked. You must determine soil bearing values for support footings. If the jacking support stiffness exceeds the described minimum stiffness, increase the lateral design forces to be compatible with the jacking support lateral stiffness.

Replace the 1st paragraph of section 48-5.03 with:

10-19-18

Construct the jacking support system under the specifications for falsework in section 48-2.03.

AA

49 PILING

10-19-18

Replace the 6th paragraph of section 49-1.01D(4) with:

10-19-18

Except for load test piles and anchor piles, drive the 1st production pile in the control zone. Do not install any additional production piles until dynamic monitoring has been performed, and the Engineer provides you with the bearing acceptance criteria curves for any piles represented by the dynamically monitored piles.

Replace the 3rd paragraph of section 49-2.01D with:

10-19-18

The payment quantity for furnish piling is the length measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff, except for dynamically monitored piles. For dynamically monitored piles, the payment quantity for furnish piling includes an additional length of 2 times the largest cross-sectional dimension of the pile plus 2 feet.

Add to the end of section 49-2.02A(2):

10-19-18

longitudinal weld length: The length of a continuous longitudinal weld.

circumferential weld length: The length of a continuous weld around the circumference of the pipe pile.

spiral weld length: The length of one full 360-degree spiral weld revolution around the circumference of the pipe pile.

Replace the 3rd paragraph of section 49-2.02A(4)(b)(iii)(B) with:

10-19-18

For welding performed under AWS D1.1:

1. Perform NDT on 25 percent of each longitudinal, circumferential, or spiral weld length using RT or UT.
2. If repairs are required in a portion of the tested weld:
 - 2.1. Perform additional NDT on untested areas on each end of the initial portion tested. The length of additional NDT on each end must equal 10 percent of the weld length. If it is not possible to perform 10 percent of the weld length on one end, perform the remaining percentage on the other end.
 - 2.2. After this additional 20 percent of NDT is performed, determine and record the total cumulative repair lengths from all NDT for each weld length. If the cumulative weld repair length is equal to or more than 10 percent of the weld length, then perform NDT on the entire weld length.
 - 2.3. Perform NDT on the repaired portion plus 2 inches on each end of the repaired weld excavation.

Replace the 2nd paragraph of section 49-2.02A(4)(b)(iii)(C) with:

10-19-18

Perform NDT on 25 percent of the weld length performed by each welder, using RT or UT at locations selected by the Engineer. The Engineer may select several locations on a given splice. The cover pass must be ground smooth at locations to be tested.

Replace the 4th paragraph of section 49-2.02A(4)(b)(iii)(C) with:

10-19-18

If repairs are required in a portion of the tested weld:

1. Perform additional NDT on untested areas on each end of the initial portion tested. The length of additional NDT on each end must equal 10 percent of the pipe's outside circumference. If it is not possible to perform 10 percent of the weld length on one end, perform the remaining percentage on the other end.
2. After this additional 20 percent of NDT is performed, determine and record the total cumulative repair lengths from all NDT for each weld length. If the cumulative weld repair length is equal to or more than 10 percent of the pipe's outside circumference, then perform NDT on the entire weld length.
3. Perform NDT on the repaired portion plus 2 inches on each end of the repaired weld excavation.

AA

51 CONCRETE STRUCTURES

10-19-18

Add to section 51-1.03:

10-19-18

51-1.03J Temporary Decking

If you are unable to complete bridge reconstruction activities before the bridge is to be opened to traffic, furnish and maintain temporary decking under section 48-4 until that portion of the work is complete.

10-19-18

AA

10-19-18

10-19-18

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57 WOOD AND PLASTIC LUMBER STRUCTURES

10-19-18

Replace the table in the 4th paragraph of section 57-3.02C with:

10-19-18

Quality characteristic	Test method	Requirement
Density of concrete core (kg/m ³ , min)	ASTM D792	1,762
28-day compressive strength of concrete core (psi, min)	ASTM C579	5,000
Structural strength of shell: Tensile strength, tensile modulus (percent loss) Flexural strength, flexural modulus (percent loss)	ASTM D638 ASTM D790	Less than 10 after UV deterioration test specified for plastic lumber
Dry film thickness of coating (mils, min)	--	15
Color change of coating	ASTM D4587, Test Cycle 2	No visible color change when tested for 800 hours
Initial adhesion of coating (psi, min)	ASTM D4541, Test Method D, E, or F and Protocol 2	150
Decrease in initial adhesion of coating, decrease (percent)	ASTM D4541, Test Method D, E, or F and Protocol 2 ASTM D1183, Test Condition D ^a	No more than 10 following 2 exposure cycles

^aUse a low temperature phase at 4 ± 5 °F and high temperature phase at 140 ± 5 °F.

AA

59 STRUCTURAL STEEL COATINGS

10-19-18

Replace the 2nd paragraph in section 59-1.01D with:

10-19-18

Measure coating adhesion strength with a self-aligning adhesion tester under ASTM D4541, Test Method D, E, or F and Protocol 2.

Replace the 2nd paragraph of section 59-1.02C with:

10-19-18

Coatings selected for use must comply with the volatile organic compound concentration limits specified for the air quality district where the coating is applied. The undercoats and finish or final coats selected for use must be compatible with each other.

Add after the paragraph of section 59-2.01A(3)(a):

10-19-18

If requested by the Engineer, submit documentation from the coating manufacturer verifying the compatibility of the undercoats and finish or final coats selected for use.

AA

60 EXISTING STRUCTURES

10-19-18

Replace *Reserved* in section 60-2.02B(1) with:

10-19-18

Design criteria for temporary support shoring and temporary bracing must comply with section 48-3.02B.

10-19-18

Delete section 60-2.02B(2).

Add to section 60-3.01A:

10-19-18

If you are unable to complete bridge reconstruction activities before the bridge is to be opened to traffic, furnish and maintain temporary decking under section 48-4 until that portion of the work is complete.

Replace the 3rd and 4th paragraphs of section 60-3.02C(3) with:

10-19-18

Remove asphalt concrete surfacing and membrane seal by cold milling. Do not remove more than 1/2 inch of the existing concrete slab during cold-milling activities.

Add to section 60-3.02C(3):

10-19-18

Where a portion of the asphalt concrete surfacing is to remain, saw cut a 2-inch-deep true line along the edge to remain in place before removing asphalt concrete. Remove the asphalt concrete without damaging the surfacing to remain in place.

Replace the 9th paragraph of section 60-3.04B(3)(c) with:

10-19-18

Protect the overlay from moisture and do not allow traffic or equipment on the overlay (1) for a minimum of 4 hours cure time after final finishing and (2) until the rebound test results for the final finish show an average reading of at least 28 when tested under ASTM C805. The cure time may be extended if ordered. The rebound test may not be used to reduce the 4-hour cure time of the overlay.

Replace item 2 in the list in the 1st paragraph of section 60-4.06A(4) with:

10-19-18

2. 2nd sentence of clause 3.13.2 and the 1st sentence of clause 3.13.3 of AWS D1.5 do not apply.

Replace the 10th paragraph of section 60-4.09B(2)(a) with:

10-19-18

Steel parts must comply with ASTM A36/A36M or A576, Grade 1030 and must not be rimmed or capped steel.

AA

10-19-18

[illegible]

82 SIGNS AND MARKERS

10-19-18

10-19-18

Replace the 2nd paragraph in section 82-5.02E with:

10-19-18

Replace section 82-5.02H with:

10-19-18

Letters and numerals on a milepost marker must be made with opaque black paint or film. The paint and film must have an equivalent outdoor weatherability as the retroreflective sheeting specified in ASTM D4956. Nonreflective, opaque, black film must be vinyl or acrylic material.

Film for letters and numerals must be computer cut and have pressure-sensitive adhesive.

Replace the 5th paragraph of section 82-5.03 with:

10-19-18

Use stencils to paint letters and numerals on milepost markers.

AA

10-19-18

Replace section 84-2 with:

10-19-18

84-2.01 GENERAL

84-2.01A Summary

Section 84-2 includes specifications for applying traffic stripes and pavement markings.

Traffic stripes and pavement markings must comply with ASTM D6628 for daytime and nighttime color.

Retroreflectivity must be measured under ASTM E1710 and the sampling protocol specified in ASTM D7585.

84-2.01B Definitions

pavement marking: Transverse marking such as (1) a limit line, (2) a stop line, or (3) a word, symbol, shoulder, parking stall, or railroad-grade-crossing marking.

traffic stripe: Longitudinal centerline or lane line used for separating traffic lanes in the same direction of travel or in the opposing direction of travel or a longitudinal edge line marking the edge of the traveled way or the edge of a lane at a gore area separating traffic at an exit or entrance ramp. A traffic stripe is shown as a traffic line.

84-2.01C Submittals

For each lot or batch of traffic stripe material, primer, and glass beads, submit:

1. Certificate of compliance, including the material name, lot or batch number, and manufacture date
2. METS notification letter stating that the material is authorized for use, except for thermoplastic and primer
3. SDS
4. Manufacturer's Instructions

For each lot or batch of thermoplastic, submit a manufacturer's certificate of compliance and the following test results from the California Test 423:

1. Brookfield Thermosel viscosity
2. Hardness
3. Yellowness index, white only
4. Daytime luminance factor
5. Yellow color, yellow only
6. Glass bead content
7. Binder content

The date of the test must be within 1 year of use.

Submit test results for each lot of beads specifying the EPA test methods used and tracing the lot to the specific test sample. The testing for lead and arsenic content must be performed by an independent testing laboratory.

Submit the thermoplastic test stripe to the Engineer.

Submit the retroreflectivity test result within 5 days of testing the traffic stripes and pavement markings. The data must include the retroreflectivity, time, date, and GPS coordinates for each measurement.

84-2.01D Quality Assurance

84-2.01D(1) General

Reserved

84-2.01D(2) Quality Control

Before starting permanent application of methyl methacrylate and two component paint traffic stripes and pavement markings, apply a test stripe on roofing felt or other suitable material in the presence of the Engineer. The test stripe section must be at least 50 feet in length.

Upon request, apply a thermoplastic test stripe on suitable material in the presence of the Engineer during the application of thermoplastic traffic stripes or markings. The test stripe must be at least 1 foot in length.

Remove loose glass beads before measuring the retroreflectivity. Obtain authorization to proceed with the application of traffic stripes and pavement markings.

Within 30 days of application, test the traffic stripes and pavement markings under the test methods and frequencies shown in the following table:

Traffic Stripe Testing Frequency

Quality characteristic	Test method	Minimum sampling and testing frequency
Initial retroreflectivity (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)	ASTM E1710	ASTM D7585 ^a
White		
Yellow		

^aUse the referee evaluation protocol for project length less than 10 miles. For project lengths greater than or equal to 10 miles, add one evaluation for every additional mile.

Verify the glass bead application rate by stabbing the glass bead tank with a calibrated rod.

84-2.01D(3) Department Acceptance

The Engineer will perform a nighttime, drive-through, visual inspection of the retroreflectivity of the traffic stripes and pavement markings and notify you of any locations with deficient retroreflectivity. Test the retroreflectivity of the deficient areas to confirm striping and pavement markings meets the requirements.

The thermoplastic test stripe will be tested for yellow color, daytime luminance factor, and yellowness index requirements by METS.

84-2.02 MATERIALS

84-2.02A General

Reserved

84-2.02B Glass Beads

Each lot of glass beads must comply with EPA Test Method 3052 and 6010B or 6010C. Glass beads must contain less than 200 ppm each of arsenic and lead.

Type 1 glass beads must comply with AASHTO M 247.

Type 2 glass beads must comply with AASHTO M 247. At least 75 percent of the beads by count must be true spheres that are colorless and do not exhibit dark spots, air inclusions, or surface scratches when viewed under 20X magnification.

High-performance glass beads must be on the Authorized Material List for high-performance glass beads.

Large-gradation glass beads must be on the Authorized Material List for two component traffic paint.

Glass beads for methyl methacrylate must be on the Authorized Material List for methyl methacrylate traffic striping and pavement marking.

Glass beads for paint must comply with State Specification 8010-004.

Glass beads must be surface treated, according to the bead and the material manufacturer's instructions, to promote adhesion with the specified material.

84-2.02C Thermoplastic

Thermoplastic must comply with State Specification PTH-02HYDRO, or PTH-02ALKYD.

Sprayable thermoplastic must comply with State Specification PTH-02SPRAY.

Each lot or batch of thermoplastic must be tested under California Test 423.

84-2.02D Methyl Methacrylate

Methyl methacrylate traffic paint must:

1. Be on the Authorized Material List for methyl methacrylate traffic striping and pavement marking
2. Be Category 2

84-2.02E Traffic Striping and Pavement Marking Tape

Traffic striping and pavement marking tape must be on the Authorized Material List for signing and delineation materials.

White tape must have an initial retroreflectivity of a minimum 700 mcd/m².

Yellow tape must be have an initial retroreflectivity of a minimum 500 mcd/m2.

When contrast is required for traffic stripping and pavement marking tape, the tape must be pre-formed and retroreflective, consisting of a white film with retroreflective beads and a contrasting black film border. The contrasting black border must be a nonreflective film bonded on each side of the white film to form a continuous roll. Each black border must be a minimum of 2 inches wide. The width of the tape must be at least 4 inches wider than the stripe width.

84-2.02F Two-Component Paint

Two-component traffic paint must be on the Authorized Material List for two component traffic paint.

84-2.02G Paint

Paint must comply with the requirements shown in following table:

Paint Specifications		
Paint type	Color	Specification
Waterborne traffic line	White, yellow, and black	State Specification PTWB-01R2
Waterborne traffic line for the international symbol of accessibility and other curb markings	Blue, red, and green	Federal Specification TT-P-1952E

84-2.02H–84-2.02L Reserved

84-2.03 CONSTRUCTION

84-2.03A General

Establish the alignment for traffic stripes and the layouts for pavement markings with a device or method that will not conflict with other traffic control devices.

Protect existing retroreflective pavement markers during work activities.

Remove existing pavement markers that are coated or damaged by work activities and replace with an equivalent marker on the Authorized Material List for signing and delineation materials.

A completed traffic stripe or pavement marking must:

1. Have well defined edges
2. Be uniform
3. Be free from runs, bubbles, craters, drag marks, stretch marks, and debris

A completed traffic stripe must:

1. Be straight on a tangent alignment
2. Be a true arc on a curved alignment
3. Not deviate from the width shown by more than:
 - 3.1. 1/4 inch on a tangent alignment
 - 3.2. 1/2 inch on a curved alignment

The length of the gaps and individual stripes that form a broken traffic stripe must not deviate by more than 2 inches from the lengths shown. The gaps and stripes must be uniform throughout the entire length of the traffic stripe.

Protect newly placed traffic stripes and pavement markings from traffic and work activities until the traffic stripes and pavement markings are dry or hard enough to bear traffic.

Use mechanical methods to remove dirt, contaminants, and loose material from the pavement surface before applying the traffic stripe or pavement marking.

Use abrasive blast cleaning to remove laitance and curing compound from the surface of new concrete pavement before applying the traffic stripe or pavement marking.

Construct recesses as shown in the following table:

Recess Depth Requirements

Material	Requirement	
	Depth (mils)	Depth (in)
Thermoplastic	375	3/8
Two component traffic paint	250	1/4
Methyl methacrylate traffic paint	250	1/4

Construct recesses for double traffic stripes in a single pass.

Before applying the traffic stripes and pavement markings:

1. Allow wet ground recesses to dry a minimum of 24 hours
2. Remove all powdery residue from dry recess
3. Keep the recesses dry and free from debris

Apply traffic stripes and pavement markings before the end of the same work shift.

84-2.03B Application of Traffic Stripes and Pavement Markings

84-2.03B(1) General

Apply material for a pavement marking with a stencil or a preformed marking.

Immediately remove drips, overspray, improper markings, or material tracked by traffic, using an authorized method.

Apply a traffic stripe or a pavement marking only to a clean, dry surface during a period when the pavement surface temperature is above 50 degrees F.

Apply traffic stripe or pavement marking and glass beads in a single pass. You may apply the glass beads by hand on pavement markings.

Embed glass beads to a depth of 1/2 their diameters.

Distribute glass beads uniformly on traffic stripe and pavement markings.

Glass beads with integral color must match the color of the stripe or pavement marking.

Apply glass beads with two separate applicator guns when two gradations are specified.

Allow enough overlap distance between new and existing striping patterns to ensure continuity at the start and end of the transition.

The retroreflectivity of applied traffic stripes and pavement markings must comply with the requirements shown in the following table:

Retroreflectivity Requirements

Traffic stripe material	White (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)	Yellow (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)
Paint	250	125
Thermoplastic	250	125
Thermoplastic with wet night enhanced visibility	700	500
Two component	250	125
Methyl methacrylate	500	300
Tape	700	500

84-2.03B(2) Thermoplastic

84-2.03B(2)(a) General

Apply primer or surface preparation adhesive under the manufacturer's instructions:

1. To all roadway surfaces except for asphaltic surfaces less than 6 months old
2. At a minimum rate of 1 gallon per 300 square feet

3. To allow time for the thermoplastic primer to dry and become tacky before application of the thermoplastic

Do not thin the primer.

Preheat thermoplastic using preheaters with mixers having a 360-degree rotation.

Apply thermoplastic in a single uniform layer by spray or extrusion methods.

Completely coat and fill voids in the pavement surface with the thermoplastic.

Apply recessed thermoplastic at a thickness so that the top is 0 to 1/16 inch below the pavement surface.

84-2.03B(2)(b) Extruded Thermoplastic

Apply extruded thermoplastic at a temperature of 400 to 425 degrees F or as recommended by the manufacturer.

Apply extruded thermoplastic for a traffic stripe at a rate of at least 0.36 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied traffic stripe must be at least 0.060 inch thick.

Apply extruded thermoplastic pavement markings at a thickness from 0.100 to 0.150 inch.

Apply Type 2 glass beads to the surface of the molten thermoplastic at a rate of at least 8 lb of beads per 100 sq ft.

84-2.03B(2)(c) Sprayable Thermoplastic

Apply sprayable thermoplastic at a temperature of 350 to 400 degrees F.

Apply sprayable thermoplastic for a traffic stripe at a rate of at least 0.24 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied stripe must be at least 0.040 inch thick.

84-2.03B(2)(d) Thermoplastic with Enhanced Wet-Night Visibility

Apply a thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility in a single pass and in the following order:

1. Uniform layer of extruded thermoplastic
2. Layer of high-performance glass beads
3. Layer of Type 2 glass beads

Apply thermoplastic with enhanced wet-night visibility at a maximum speed of 8 mph.

Apply thermoplastic with enhanced wet-night visibility for a traffic stripe at a rate of at least 0.47 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied stripe must be at least 0.090 inch thick.

Apply thermoplastic with enhanced wet-night visibility for a pavement marking at a rate of at least 1.06 lb of thermoplastic per square foot of marking. The applied pavement marking must be at least 0.100 inch thick.

Apply high-performance glass beads at a rate of at least 6 lb of glass beads per 100 sq ft of stripe or marking. Apply Type 2, glass beads at a rate of at least 8 lb of glass beads per 100 sq ft of stripe or marking.

84-2.03B(3) Methyl Methacrylate

Apply the methyl methacrylate when the pavement surface and atmospheric temperatures are from 40 to 104 degrees F.

Apply methyl methacrylate paint at a minimum thickness of 0.090 inch.

Apply recessed methyl methacrylate paint at a minimum thickness of 0.200 inch.

Apply the glass beads recommended by the methyl methacrylate manufacturer.

84-2.03B(4) Traffic Striping and Pavement Marking Tape

Do not use traffic stripe and pavement marking tape on existing open graded friction course or chip seal.

Prepare pavement surface and use primer under the traffic tape manufacturer's written instructions. Apply tape to clean and dry pavement surface. Roll or tamp the traffic tape in place.

84-2.03B(5) Two-Component Paint

Apply a two-component painted traffic stripe or pavement marking in a single pass and in the following order:

1. Coat of two-component paint
2. Application of large gradation glass beads recommended by the two-component paint manufacturer
3. Application of Type 1 glass beads

Apply two-component paint when the pavement surface temperature is above 39 degrees F and the atmospheric temperature is above 36 degrees F. The temperature of the paint must comply with the paint manufacturer's instructions.

Apply two-component paint and glass beads at a maximum speed of 10 mph.

Apply large-gradation glass beads at a minimum rate of 11.7 lb of beads per gallon of paint.

Apply Type 1 glass beads at a minimum rate of 8.3 lb of beads per gallon of paint.

Apply two-component paint for the traffic stripes and pavement markings at the thickness and application rates shown in the following table:

Type of pavement	Stripe thickness (min, inch)	Application rate (min, sq ft/gal)
HMA open graded/chip seal	0.025	64
HMA dense graded	0.020	80
Concrete	0.020	80

Apply recessed two-component paint at a thickness between 0.020 and 0.025 inch.

84-2.03B(6) Paint

Do not apply paint if:

1. Fresh paint could become damaged by rain, fog, or condensation
2. Atmospheric temperature could drop below 50 degrees F during the drying period

Do not thin paint.

Use mechanical means to paint traffic stripes and pavement markings and to apply glass beads for traffic stripes.

The striping machine must be capable of superimposing successive coats of paint on the 1st coat and on existing stripes at a minimum speed of 5 mph.

Where the configuration or location of a traffic stripe is such that the use of a striping machine is not practicable, you may apply the traffic paint and glass beads by other methods and equipment if authorized.

Apply traffic stripes and pavement markings in 1 coat on existing pavement surfaces, at an approximate rate of 107 sq ft/gal.

Apply traffic stripes and pavement markings in 2 coats on a new pavement surface. The 1st coat of paint must be dry before applying the 2nd coat.

Apply 2-coat paint at the approximate rate of 215 sq ft/gal for each coat.

Paint a 1-coat, 3-inch-wide black stripe between the two 6-inch-wide yellow stripes of a double traffic stripe. If the two 6-inch-wide yellow stripes are applied in 2 coats, apply the black stripe concurrently with the 2nd coat of the yellow stripes.

On 2-lane highways:

1. If the 1st coat of the centerline stripe is applied in the same direction as increasing post miles, use the right-hand spray gun of the 3 spray guns to apply a single yellow stripe
2. If the 1st coat of the centerline stripe is applied in the same direction as decreasing post miles, use the left-hand spray gun of the 3 spray guns to apply a single yellow stripe
3. Apply the 2nd coat of centerline striping in the opposite direction of the 1st coat

Apply glass beads at an approximate rate of 5 lb of beads per gallon of paint.

Verify the application rate of paint by stabbing the paint tank with a calibrated rod. If the striping machine has paint gauges, the Engineer may measure the volume of paint using the gauges instead of stabbing the paint tank with a calibrated rod.

84-2.03B(7) Contrast Striping

Contrast striping consists of black striping placed on each side or end of a white stripe.

You may use permanent tape instead of paint or thermoplastic.

Apply contrast stripe paint in one coat.

Do not use glass beads or other reflective elements in contrast striping material.

84-2.03B(7)–84-2.03B(10) Reserved

84-2.04 PAYMENT

The payment quantity for a traffic stripe is the length measured along the line of the traffic stripe without deductions for gaps in the broken traffic stripe.

The payment quantity for a pavement marking is the area covered.

A double traffic stripe consisting of two 6-inch-wide yellow stripes are measured as 2 traffic stripes except for painted traffic stripes and sprayable thermoplastic traffic stripes. A double sprayable thermoplastic traffic stripe consisting of two 6-inch-wide yellow stripes are measured as single traffic stripe.

A double painted traffic stripe consisting of two 6-inch-wide yellow stripes separated by a 3-inch-wide black stripe is measured as a single traffic stripe.

The payment quantity for contrast striping is the length measured along the line of the traffic stripe without deductions for gaps in the broken traffic stripe.

Replace section 84-9 with:

10-19-18

84-9 EXISTING MARKINGS

84-9.01 GENERAL

84-9.01A Summary

Section 84-9 includes specifications for removing existing markings.

Work performed on existing markings must comply with section 15.

84-9.01B Definitions

Reserved

84-9.01B Submittals

Submit your proposed method for removing traffic stripes and pavement markings at least 7 days before starting the removal work. Allow 2 business days for the review.

84-9.02 MATERIALS

Not Used

84-9.03 CONSTRUCTION

84-9.03A General

Remove existing traffic stripes before making any changes to the traffic pattern.

Remove existing traffic stripes and pavement markings before applying the following materials:

1. Traffic stripe and pavement marking tape
2. Two component traffic stripes and pavement markings
3. Methyl methacrylate traffic stripes and pavement markings

Remove contrast treatment, traffic stripes and pavement markings, including any paint in the gaps, by methods that do not remove pavement to a depth of more than 1/8 inch.

Remove pavement markings such that the old message cannot be identified. Make any area removed by grinding rectangular. Water must not puddle in the ground areas. Fog seal ground areas on asphalt concrete pavement.

Sweep up or vacuum any residue before it can (1) be blown by traffic or wind, (2) migrate across lanes or shoulders, or (3) enter a drainage facility.

84-9.03B Remove Traffic Stripes and Pavement Markings Containing Lead

Reserved

84-9.03C–84-9.03J Reserved

84-9.04 PAYMENT

The payment quantity for remove traffic stripe is the measured length multiplied by:

1. 0.67 for a single 4-inch-wide traffic stripe
2. 1.34 for a single 8-inch-wide traffic stripe
3. 2 for a double traffic stripe

The payment quantity for remove traffic stripe does not include the gaps in broken traffic stripes. Payment for removal of paint evident in a gap is included in the payment for remove traffic stripe of the type involved.

If no bid item is shown on the Bid Item List for remove pavement marking, remove pavement marking is paid for as remove traffic stripe of the types shown in the Bid Item List and the payment quantity for 1 square foot of pavement marking is 3 linear feet.

AA

DIVISION X ELECTRICAL WORK

86 GENERAL

10-19-18

Replace section 86-1.01B with:

10-19-18

86-1.01B Definitions

accessible pedestrian signal: Accessible pedestrian signal as defined in the *California MUTCD*.

accessible walk indication: Activated audible and vibrotactile action during the walk interval.

actuation: Actuation as defined in the *California MUTCD*.

ambient sound level: Background sound level in dB at a given location.

ambient sound sensing microphone: Microphone that measures the ambient sound level in dB and automatically adjusts the accessible pedestrian signal speaker's volume.

audible speech walk message: Audible prerecorded message that communicates to pedestrians which street has the walk interval.

CALiPER: Commercially Available LED Product Evaluation and Reporting. A U.S. Department of Energy program that individually tests and provides unbiased information on the performance of commercially available LED luminaires and lights.

controller assembly: Assembly for controlling a system's operations, consisting of a controller unit and auxiliary equipment housed in a waterproof cabinet.

controller unit: Part of the controller assembly performing the basic timing and logic functions.

correlated color temperature: Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

detector: Detector as defined in the *California MUTCD*.

electrolier: Assembly of a lighting standard and luminaire.

flasher: Device for opening and closing signal circuits at a repetitive rate.

illuminance gradient: Ratio of the minimum illuminance on a 1-foot square of sign panel to that on an adjacent 1-foot square of sign panel.

inductive loop detector: Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop. An inductive loop detector includes a loop or group of loops installed in the roadway and a lead-in cable installed and connected inside a controller cabinet.

junction temperature: Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.

L70: Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from the initial values.

lighting standard: Pole and mast arm supporting the luminaire.

link: Part of a system which provides a data connection between a transmitter and receiver.

LM-79: Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

LM-80: Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing and estimating the long-term performance of LEDs for general lighting purposes.

luminaire: Assembly that houses the light source and controls the light emitted from the light source.

mid-span access method: Procedure in which fibers from a single buffer tube are accessed and spliced to a multi buffer tube cable without cutting the unused fibers in the buffer tube, or disturbing the remaining buffer tubes in the cable.

National Voluntary Laboratory Accreditation Program: U.S. Department of Energy program that accredits independent testing laboratories.

optical time domain reflectometer: Fiber optic test equipment that is used to measure the total amount of power loss between two points and over the corresponding distance. It provides a visual and printed display of the relative location of system components such as fiber sections, splices and connectors as well as the losses that are attributed to each component and or defects in the fiber.

pedestrian change interval: Pedestrian change interval as defined in the *California MUTCD*.

powder coating: Coating applied electrostatically using exterior-grade, UV-stable, polymer powder.

power factor: Ratio of the real power component to the complex power component.

power meter: Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. Its display indicates the amount of power injected by the light source at the designed wavelength of the system under testing that arrives at the receiving end of the link.

pretimed controller assembly: Assembly operating traffic signals under a predetermined cycle length.

programming mechanism: Device to program the accessible pedestrian signal operation.

pull box: Box with a cover that is installed in an accessible place in a conduit run to facilitate the pulling in of wires or cables.

push button information message: Push button information message as defined in the *California MUTCD*.

push button locator tone: Push button locator tone as defined in the *California MUTCD*.

segment: Continuous cable terminated by 2 splices, 2 connectors or 1 splice and 1 connector.

signal face: Signal face as defined in the *California MUTCD*.

signal head: Signal head as defined in the *California MUTCD*.

signal indication: Signal indication as defined in the *California MUTCD*.

signal section: Signal section as defined in the *California MUTCD*.

signal standard: Pole with or without mast arms carrying 1 or more signal faces.

street side lumens: Lumens from a luminaire directed to light up areas between the fixture and the roadway, such as traveled ways and freeway lanes.

surge protection device: Subsystem or component that protects equipment against short-duration voltage transients in power line.

total harmonic distortion: Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

traffic-actuated controller assembly: Assembly for operating traffic signals under the varying demands of traffic as registered by detector actuation.

traffic phase: Traffic phase as defined in the *California MUTCD*.

vehicle: Vehicle as defined in the *California Vehicle Code*.

vibrotactile pedestrian device: Vibrotactile pedestrian device as defined in the *California MUTCD*.

10-19-18

Delete the 9th and 10th paragraphs of section 86-1.01C(1).

Replace section 86-1.01C(3) with:

10-19-18

86-1.01C(3) Luminaires

Submit for a luminaire:

1. Maximum power in watts
2. Maximum designed junction temperature
3. Heat sink area in square inches
4. Designed junction-to-ambient thermal resistance calculation with thermal resistance components clearly defined
5. L70 in hours when extrapolated for the average nighttime operating temperature
6. Life expectancy based on the junction temperature

7. Manufacturer's data sheet for the power supply, including the rated life

Submit the manufacturer's QC test data for luminaires as an informational submittal.

Replace section 86-1.01C(4) with:

10-19-18

86-1.01C(4) Reserved

Replace the 8th paragraph of section 86-1.02B(1) with:

10-19-18

High density polyethylene for innerduct must:

1. Comply with ASTM D3485, D3035, D2239, and D2447, and NEMA TC7 and TC2
2. Have a minimum tensile yield strength of 3300 psi under ASTM D638
3. Have a density of $59.6187 \text{ lb/ft}^3 \pm 0.3121 \text{ lb/in}^3$ under ASTM D1505

Replace the 4th paragraph of section 86-1.02C(1) with:

10-19-18

The cover marking must include CALTRANS and one of the following:

1. *SERVICE* for service circuits between a service point and service disconnect
2. *SERVICE IRRIGATION* for circuits from a service equipment enclosure to an irrigation controller
3. *SERVICE BOOSTER PUMP* for circuits from a service equipment enclosure to the booster pump
4. *TDC POWER* for circuits from a service equipment enclosure to telephone demarcation cabinet
5. *LIGHTING* for a lighting system
6. *SIGN ILLUMINATION* for a sign illumination system
7. *SIGNAL AND LIGHTING* for a signal and lighting system
8. *RAMP METER* for a ramp metering system
9. *TMS* for a traffic monitoring station
10. *FLASHING BEACON* for a flashing beacon system
11. *CMS* for a changeable message sign system
12. *INTERCONNECT* for an interconnect conduit and cable system
13. *FIBER OPTIC* for fiber optic cable system
14. *ELECTRICAL SYSTEMS* if more than one system is shared in the same pull box

Delete the 3rd paragraph of section 86-1.02C(2).

10-19-18

Replace the 1st and 2nd paragraphs of section 86-1.02C(3) with:

10-19-18

A traffic pull box and cover must comply with AASHTO HS20-44 and load tested under AASHTO M 306.

The frame must be anchored to the box with 2-1/4-inch-long concrete anchors with a 1/4 inch diameter. A no. 3-1/2(T) pull box must have 4 concrete anchors, one placed in each corner. No. 5(T) and no. 6(T) pull boxes must have 6 concrete anchors, one placed in each corner and one near the middle of each of the longer sides.

Replace section 86-1.02C(4)(b) with:

10-19-18

86-1.02C(4)(b) Tamper-Resistant Nontraffic Pull Box

86-1.02C(4)(b)(i) General

A tamper resistant nontraffic pull box must include a pull box with one of the following:

1. Anchored cover
2. Lockable cover
3. Pull box insert

86-1.02C(4)(b)(ii) Anchored Cover

The anchored cover must:

1. Be of 1/2-inch-thick mild steel, hot dip galvanized, post fabrication.
2. Be hot dip galvanized after manufacturing with spikes removed from the galvanized surfaces.
3. Have a center space for a top lock nut that must be torqued to 200 ft-lb.
4. Have a center opening for a stainless steel threaded cap to cover the lock nut.
5. Weigh a minimum of 85 lb.
6. Include an all-around security skirt of 1/4-inch thick steel. The skirt must be sized to encase a nontraffic pull box or sized to fit within a traffic pull box.
7. Be welded to the skirt.

86-1.02C(4)(b)(iii) Lockable Cover

The lockable cover must:

1. Be manufactured from minimum 3/16-inch-thick galvanized steel or a polymer of minimum strength equal to 3/16 inch steel.
2. Be secured to the pull box with a locking mechanism of equal or greater strength than the manufactured material.
3. Have 1/2-by-2-inch slot holes for lifting.
4. Have dimensions complying with one of the following:
 - 4.1. Department's standards for pull box covers as shown if the lockable cover is secured to the inside lip of the pull box.
 - 4.2. Department's standards for the length and width as shown for pull box covers if the lockable cover is secured to the top of the pull box.

86-1.02C(4)(b)(iv) Pull Box Insert

The pull box insert must:

1. Be made of minimum 3/16-inch-thick or 10 gauge mild hot-dipped galvanized steel
2. Have a minimum of 2 mounting brackets that rest under the side or end wall
3. Be lockable with a padlock having a minimum 3/8-inch shackle
4. Have dimensions complying with the Department's standards for the length and width as shown for pull box covers

10-19-18

Delete section 86-1.02C(4)(d).

10-19-18

Delete section 86-1.02C(4)(e).

10-19-18

Delete section 86-1.02C(4)(f).

Replace section 86-1.02D(3) with:

10-19-18

86-1.02D(3) Warning Tape

Warning tape must be orange color polyolefin film, minimum elongation of 500 percent before breakage, water and corrosion resistant, and comply with requirements shown in the following table:

Warning Tape Requirements

Quality characteristic	Requirement
Thickness (min, mil)	4
Width (in)	4
Tensile strength of material (min, psi)	2800
Message spacing intervals (ft)	3

The warning tape must have a printed message that reads: *CAUTION: CALTRANS FACILITIES BELOW.*

The printed text height and color must be 1 inch, black color text over bright orange background.

Replace the 2nd paragraph of section 86-1.02E with:

10-19-18

Each sensor must:

1. Have a dissipation factor less than 0.04 nF when measured in the 20 nF range
2. Have resistance greater than 20 Megaohms
3. Be 1/4 inch wide by 6 feet long by 1/16 inch thick
4. Have a RG-58C/U coaxial screen transmission cable, jacketed with high-density polyethylene, rated for direct burial and resistant to nicks and cuts
5. Operate over a temperature range from -40 to 160 degrees F
6. Have a signal to noise ratio equal to or greater than 10 to 1
7. Have an output signal of a minimum 250 mV \pm 20 percent for a wheel load of 400 lb at 55 mph and 70 degrees F
8. Have an insulation resistance greater than 500 M Ω
9. Have a life cycle of a minimum 25 million equivalent single axle loadings

Replace section 86-1.02F(1) with:

10-19-18

86-1.02F(1) General

Conductors and cables must be clearly and permanently marked the entire length of their outer surface with:

1. Manufacturer's name or trademark
2. Insulation-type letter designation
3. Conductor size
4. Voltage
5. Number of conductors for a cable

The minimum insulation thickness and color code requirements must comply with NEC.

Replace the 2nd paragraph of section 86-1.02F(2)(a) with:

10-19-18

Conductors must be identified as shown in the following table:

Conductor Identification

Circuit	Signal phase or function	Identification			Copper size
		Insulation color		Band symbols	
		Base	Stripe ^a		

Signals (vehicle) ^{a,b}	2, 6	Red, yellow, brown	Black	2, 6	14
	4, 8	Red, yellow, brown	Orange	4, 8	14
	1, 5	Red, yellow, brown	None	1, 5	14
	3, 7	Red, yellow, brown	Purple	3, 7	14
	Ramp meter 1	Red, yellow, brown	None	No band required	14
	Ramp meter 2	Red, yellow, brown	Black	No band required	14
Pedestrian signals	2p, 6p	Red, brown	Black	2p, 6p	14
	4p, 8p	Red, brown	Orange	4p, 8p	14
	1p, 5p	Red, brown	None	1p, 5p	14
	3p, 7p	Red, brown	Purple	3p, 7p	14
Push button assembly or accessible pedestrian signal	2p, 6p	Blue	Black	P-2, P-6	14
	4p, 8p	Blue	Orange	P-4, P-8	14
	1p, 5p	Blue	None	P-1, P-5	14
	3p, 7p	Blue	Purple	P-3, P-7	14
Traffic signal controller cabinet	Ungrounded circuit conductor	Black	None	CON-1	6
	Grounded circuit conductor	White	None	CON-2	6
Highway lighting pull box to luminaire	Ungrounded - line 1	Black	None	No band required	14
	Ungrounded - line 2	Red	None	No band required	14
	Grounded	White	None	No band required	14
Multiple highway lighting	Ungrounded - line 1	Black	None	ML1	10
	Ungrounded - line 2	Red	None	ML2	10
	Ungrounded - line 3	White	None	ML3	10
Lighting control	Ungrounded - Photoelectric unit	Black	None	C1	14
	Switching leg from Photoelectric unit or SM transformer	Red	None	C2	14
Service	Ungrounded - line 1 (signals)	Black	None	No band required	6
	Ungrounded - line 2 (lighting)	Red	None	No band required	8
Sign lighting	Ungrounded - line 1	Black	None	SL-1	10
	Ungrounded - line 2	Red	None	SL-2	10
Flashing beacons	Ungrounded between flasher and beacons	Red or yellow	None	FB-Location. ^c	14
Grounded circuit conductor	Push button assembly or accessible pedestrian signal	White	Black	No band required	14
	Signals and multiple lighting	White	None	No band required	10
	Flashing beacons and sign lighting	White	None	No band required	12
	Lighting control	White	None	C-3	14
	Service	White	None	No band required	14

Railroad preemption		Black	None	R	14
Spares		Black	None	No band required	14

Notes:

^aOn overlaps, the insulation is striped for the 1st phase in the designation, e.g., phase (2+3) conductor is striped as for phase 2.

^bBand for overlap and special phases as required

^cFlashing beacons having separate service do not require banding.

10-19-18

Delete the 4th paragraph of section 86-1.02F(2)(a).

Replace the 2nd paragraph of section 86-1.02F(2)(c)(ii) with:

10-19-18

An equipment grounding conductor must be insulated.

Replace the 3rd paragraph of section 86-1.02F(3)(d)(ii) with:

10-19-18

Cable must comply with the requirements shown in the following table:

Cable type	Conductor quantity and type	Cable jacket thickness (mils)		Maximum nominal outside diameter (inch)	Conductor color code
		Average	Minimum		

3CSC	3 no. 14	44	36	0.40	Blue/black stripe, blue/orange stripe, white/black stripe
5CSC	5 no. 14	44	36	0.50	Red, yellow, brown, black, white
9CSC	1 no. 12 8 no. 14	60	48	0.65	No. 12 - white, No. 14 - red, yellow, brown, black, red/black stripe, yellow/black stripe, brown/black stripe, white/black stripe
12CSC	1 no. 12 11 no. 14	60	48	0.80	No. 12 - white No. 14 - red, yellow, brown, black, red/black stripe, yellow/black stripe, brown/black stripe, black/red stripe, black/white stripe, red/white stripe, brown/white stripe
28CSC	1 no. 10 27 no. 14	80	64	0.90	No. 10 - white No. 14 - red/black stripe, yellow/black stripe, brown/black stripe, red/orange stripe, yellow/orange stripe, brown/orange stripe, red/silver stripe, yellow/silver stripe, brown/silver stripe, red/purple stripe, yellow/purple stripe, brown/purple stripe, red/2 black stripes, brown/2 black stripes, red/2 orange stripes, brown/2 orange stripes, red/2 silver stripes, brown/2 silver stripes, red/2 purple stripes, brown/2 purple stripes, blue/black stripe, blue/orange stripe, blue/silver stripe, blue/purple stripe, white/black stripe, black/red stripe, black

Replace the 3rd paragraph of section 86-1.02G with:

10-19-18

The self-adhesive reflective labels must:

1. Be from 3 to 5 mils thick
2. Have all black capital characters on a white background
3. Extend beyond the character by a minimum of 1/4 inch

Replace the 4th paragraph of section 86-1.02H with:

10-19-18

PVC electrical tape must have a minimum thickness of 6 mils.

Replace section 86-1.02K with:

10-19-18

86-1.02K Luminaires

86-1.02K(1) General

A luminaire must:

1. Be self-contained, not requiring assembly.
2. Comply with UL 1598 for luminaires in wet locations.
3. Have a power supply with ANSI/IEC rating of at least IP65.
4. Weigh less than 35 lb.
5. Have a minimum operating life of 100,000 hours when operated for an average time of 11.5 hours at an average temperature of 70 degrees F.
6. Operate over a temperature range from -40 to 130 degrees F.
7. Be operationally compatible with photoelectric controls.
8. Have a correlated color temperature range from 2700 to 3500 K and a color rendering index of 70 or greater.
9. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end.
10. Comply with California Test 611.
11. Have a power factor of 0.90 or greater. The total harmonic distortion, current, and voltage induced into a power line by a luminaire must not exceed 20 percent.
12. Comply with the maximum power consumption and isofootcandle curves as shown.
13. Be on the Authorized Material List for LED luminaires or must be submitted for testing and addition to the AML.

A luminaire must include a surge protection device to withstand high-repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The device must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The surge protection device must comply with UL 1449 and ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

The luminaire must operate over the entire voltage range from 120 to 480 V(ac), 60 ± 3 Hz or one of the following:

1. From 95 to 277 V(ac) for luminaires rated 120 V(ac) or 240 V(ac)
2. From 347 to 480 V(ac) for luminaires rated 480 V(ac)

The fluctuations of line voltage must have no visible effect on the luminous output.

The L70 of the luminaire must be the minimum operating life or greater. Illuminance measurements must be calibrated to standard photopic calibrations.

The luminaire's housing must withstand a 1008 hour cyclic salt fog spray/UV test under ASTM D5894 and an evaluation under ASTM D714 with a blister size of 8 or greater and no more than medium density.

The luminaire's housing must be marine-grade alloy with less than 0.2 percent copper or die cast aluminum. All exposed aluminum must be anodized. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

External bolts, screws, hinges, hinge pins, and door closure devices must be corrosion resistant.

The housing must be designed to prevent the buildup of water on its top surface. Exposed heat sink fins must be oriented to allow water to run off the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an UL 60529 rating of IP66. The power supply enclosure must be protected to at least an UL 60529 rating of IP43.

If the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire's housing separately from other components. The door must be secured to the housing to prevent accidental opening. A safety cable must mechanically connect the door to the housing.

A luminaire must have a barrier-type terminal block secured to the housing to connect field wires. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6.

The conductors and terminals must be identified and marked.

If needed, each refractor or lens must be made of UV-inhibiting high-impact plastic, such as acrylic or polycarbonate, or heat and impact-resistant glass. The refractor or lens must be resistant to scratching. Polymeric materials, except for the lenses of enclosures containing either the power supply or electronic components of the luminaire, must be made of UL94 V-0 flame-retardant materials.

The luminaire must be permanently marked inside the unit and outside of its packaging box. Marking consists of:

1. Manufacturer's name or trademark
2. Month and year of manufacture
3. Model, serial, and lot numbers
4. Rated voltage, wattage, and power in VA

An LED luminaire must:

1. Comply with Class A emission limits under 47 CFR 15(B) for the emission of electronic noise.
2. Have a power supply with:
 - 2.1. 2 leads to accept standard 0-10 V(dc).
 - 2.2. Dimming control compatible with IEC 60929, Annex E. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.
 - 2.3. Case temperature self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.
3. Have passive thermal management with enough capacity to ensure proper heat dissipation and functioning of the luminaire over its minimum operating life. The maximum junction temperature for the minimum operating life must not exceed 221 degrees F.
4. Have a junction-to-ambient thermal resistance of 95 degrees F per watt or less.
5. Contain circuitry that automatically reduces the power to the LEDs so the maximum junction temperature is not exceeded when the ambient temperature is 100 degrees F or greater.
6. Have a heat sink made of aluminum or other material of equal or lower thermal resistance. The use of fans or other mechanical devices is not allowed for cooling the luminaire.

The catastrophic loss or failure of 1 LED must not result in the loss of more than 20 percent of the total luminous output of the LED luminaire.

86-1.02K(2) Roadway luminaires

A roadway luminaire must:

1. Have a housing color that matches a color no. 26152 to 26440, 36231 to 36375, or 36440 of AMS-STD-595
2. Have an ANSI C136.41-compliant, locking-type, photocontrol receptacle with dimming connections and a watertight shorting cap
3. Not allow more than 2.5 percent of the rated lumens to project above 80 degrees measured up from the vertical plane in the direction of the roadway
4. Have equipment identification character labels outside the unit on the side that will face the road. Equipment identification characters consist of:
 - 4.1. R1 for Roadway 1, R2 for Roadway 2, R3 for Roadway 3, and R4 for Roadway 4
 - 4.2. Rated wattage

The luminaire's housing must have a slip fitter that must:

1. Fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches
2. Be adjustable to a minimum of ± 5 degrees from the axis of the tenon in a minimum of 5 steps: +5, +2.5, 0, -2.5, -5
3. Have clamping brackets that:
 - 3.1. Are made of corrosion-resistant materials or treated to prevent galvanic reactions
 - 3.2. Do not bottom out on the housing bosses when adjusted within the designed angular range
 - 3.3. Do not permanently set in excess of 1/32 inch when tightened

86-1.02K(3) Overhead Sign Luminaires

An overhead sign luminaire must:

1. Have a uniformity average to minimum ratio of 10:1 for the distribution of light reflected on a 16' wide by 10' high sign panel
2. Not allow more than 2.5 percent of the rated lumens to project above 65 degrees measured up from the horizontal plane in the direction of the sign panel
3. Mount at a maximum height of 12 inches above the top of the mounting rails
4. Mount directly to the sign structure as shown or with a mounting adapter that meets the material requirements of the luminaire's housing

Replace section 86-1.02M with:

10-19-18

86-1.02M Photoelectric Controls

Photoelectric control types are as shown in the following table:

Photoelectric Control Types	
Control type	Description
I	Pole-mounted photoelectric unit. Test switch and a 15-A circuit breaker per ungrounded conductor, housed in an enclosure.
II	Pole-mounted photoelectric unit. Contactor, a 15-A circuit breaker per ungrounded conductor, and test switch located in a service equipment enclosure.
III	Pole-mounted photoelectric unit. Contactor, a 15-A circuit breaker per ungrounded conductor, and a test switch housed in an enclosure.
IV	A photoelectric unit that plugs into a NEMA twist-lock receptacle, integral with the luminaire.
V	A photoelectric unit, contactor, a 15-A circuit breaker per ungrounded conductor, and test switch located in a service equipment enclosure.

The pole-mounted adaptor for Type I, II, and III photoelectric controls must include a terminal block and cable supports or clamps to support the wires.

Photoelectric unit must:

1. Have a screen to prevent artificial light from causing cycling.
2. Have a rating of 60 Hz, 105-130 V(ac), 210-240 V(ac), or 105-240 V(ac).

3. Operate at a temperature range from -20 to 55 degrees C.
4. Consume less than 10 W.
5. Be a 3-prong, twist-lock type with a NEMA IP 65 rating, ANSI C136.10-compliant.
6. Have a fail-on state.
7. Fit into a NEMA-type receptacle.
8. Turn on from 1 to 5 footcandles and turn off from 1.5 to 5 times the turn-on level. Measurements must be made by procedures in *EEI-NEMA Standards for Physical and Electrical Interchangeability of Light-Sensitive Control Devices Used in the Control of Roadway Lighting*.

Type I, II, III, and V photoelectric controls must have a test switch to allow manual operation of the lighting circuit. Switch must be:

1. Single-hole mounting, toggle type
2. 15 A, single pole and single throw
3. Labeled *Auto-Test* on a nameplate

Photoelectric control's contactor must be:

1. Normally open
2. Mechanical-armature type with contacts of fine silver, silver alloy, or equal or better material
3. Installed to provide a minimum space of 2-1/2 inches between the contactor terminals and the enclosure's sides

The terminal blocks must be rated at 25 A, 600 V(ac), molded from phenolic or nylon material, and be the barrier type with plated-brass screw terminals and integral marking strips.

Replace section 86-1.02N with:

10-19-18

86-1.02N Fused Splice Connectors

The fused splice connector for 240 and 480 V(ac) circuits must simultaneously disconnect both ungrounded conductors. The connector must not have exposed metal parts except for the head of the stainless steel assembly screw. The head of the assembly screw must be recessed a minimum of 1/32 inch below the top of the plastic boss that surrounds the head.

The connector must protect the fuse from water or weather damage. Contact between the fuse and fuse holder must be spring loaded.

Fuses must:

1. Be standard, midget, ferrule type
2. Have a nontime-delay feature
3. Be 13/32 by 1-1/2 inches

Fuse ratings for luminaires are shown in the following table:

Fuse Current Rating Requirements		
Circuit voltage	Fuse voltage rating	Soffit and roadway luminaires
120 V(ac)	250 V(ac)	5 A
240 V(ac)	250 V(ac)	5 A
480 V(ac)	500-600 V(ac)	5 A

Fuse ratings for transformers are shown in the following table:

Fuse Current Rating Requirements

Circuit voltage	Fuse voltage rating	Fuse current rating for Single phase (two wires) Transformers (primary side)		
		1 kVA	2 kVA	3 kVA
120 V(ac)	250 V(ac)	10 A	20 A	30 A
240 V(ac)	250 V(ac)	6 A	10 A	20 A
480 V(ac)	500-600 V(ac)	3 A	6 A	10 A

Replace section 86-1.02P(1) with:

10-19-18

86-1.02P(1) General

The enclosures must be rated NEMA 3R and include a dead front panel and a hasp with a 7/16-inch-diameter hole for a padlock.

Except for a service equipment enclosure, an enclosure must:

1. Be manufactured from steel and either galvanized, cadmium plated, or powder coated
2. Mount to a standard, pole, post, or sign structural frame
3. Provide a minimum space of 2-1/2 inches between the internal components and the enclosure's sides

The enclosure's machine screws and bolts must not protrude outside the cabinet wall.

The fasteners on the exterior of an enclosure must be vandal resistant and not be removable. The exterior screws, nuts, bolts, and washers must be stainless steel.

Add between 6th and 7th paragraphs of section 86-1.02P(2):

10-19-18

Service equipment enclosure must have the meter view windows located on the front side of the enclosure for Types III-AF, BF, CF and DF.

Service equipment enclosure must have the meter view windows located on the back side of the enclosure for Types III-AR, BR, CR and DR.

10-19-18

Delete section 86-1.02P(3).

Replace section 86-1.02Q(4)(a) with:

10-19-18

86-1.02Q(4)(a) General

The doors of a telephone demarcation cabinet must be attached using continuous aluminum steel piano hinges.

Add between the 2nd and 3rd paragraphs of section 86-1.02R(2):

10-19-18

Bracket arms must be long enough to allow proper alignment of signals and backplate installation.

Replace item 2 in the list in the 5th paragraph of section 86-1.02R(4)(a)(iii) with:

10-19-18

2. Be a black color throughout, including the door, matching color no. 17038, 27038, or 37038 of AMS-STD-595

Replace the 5th and 6th paragraphs of section 86-1.02T with:

10-19-18

The color of a metallic housing must match color no. 33538 of AMS-STD-595.

The color of a plastic housing must match color no. 17038, 27038, or 37038 of AMS-STD-595.

Replace item 1 in the list in the 7th paragraph of section 86-1.02T with:

10-19-18

1. Have controls for the volume level and programming the message

Replace the 11th paragraph of section 86-1.02T with:

10-19-18

The cable between the accessible pedestrian signal assembly and the pedestrian signal head must be rated for outdoor use and have a:

1. Minimum four no. 18 stranded or larger tinned copper conductors with a minimum insulation thickness of 15 mils
2. Cable jacket with a minimum thickness of 20 mils and rated for a minimum:
 - 2.1. 300 V(ac)
 - 2.2. 80 degrees C
3. Nominal outside diameter less than 350 mils
4. Conductor color code of black, white, red and green

Replace the 1st paragraph of section 86-1.02U with:

10-19-18

The housing for a push button assembly must be made of die-cast aluminum, permanent mold-cast aluminum, or UV-stabilized self-extinguishing structural plastic.

The housing must have a uniform color that matches color no. 17038, 27038, or 37038 of AMS-STD-595.

Replace the 2nd paragraph of section 86-1.02W(4) with:

10-19-18

The cured hot-melt rubberized asphalt sealant must comply with the requirements shown in the following table:

Cured Hot-Melt Rubberized Asphalt Sealant Requirements

Quality characteristic	Test method	Requirement
Cone penetration, 25 °C, 150 g, 5 s (max, 1/10 mm)	ASTM D5329	35
Flow, 60 °C, 5 hr (max, mm)		5
Resilience, 25 °C (min, %)		25
Softening point (min, °C)	ASTM D36	82
Ductility, 25 °C, 5 cm/min (min, cm)	ASTM D113	30
Flash point, Cleveland Open Cup (min, °C)	ASTM D92	288
Viscosity, no. 27 spindle, 20 rpm, 190 °C (Pa•s)	ASTM D4402	2.5–3.5

Replace the 2nd paragraph of section 86-1.02Y with:

10-19-18

A transformer must be a dry type designed for operation on a 60 Hz supply. The transformer must have a decal showing a connection diagram. The diagram must show either color coding or wire tagging with primary (H1, H2) or secondary (X1, X2) markers and the primary and secondary voltage and volt-ampere rating. A transformer must comply with the electrical requirements shown in the following table:

Transformer Electrical Requirements

Quality characteristic	Requirement
Rating (V(ac))	120/240, 120/480, 240/120, 240/480, 480/120, or 480/240
Efficiency (%)	> 95
Secondary voltage regulation and tolerance from half load to full load (%)	±3

AA

87 ELECTRICAL SYSTEMS

10-19-18

Replace *Reserved* in section 87-1.01C with:

10-19-18

Submit a digital file for geographic information system mapping for:

1. Conduit
2. Pull boxes
3. Cabinets
4. Service equipment enclosures
5. Standards

The digital file must consist of:

1. Longitudinal and latitude coordinates, under the WGS84 reference coordinate system. The coordinates must be in decimal format having 6 significant figures after the decimal point. Coordinates must be read at the center of pull boxes, cabinet, standards, and service equipment enclosures; and on top of conduit at 20-foot intervals before backfill.
2. Type, depth and size for conduits.
3. Type for pull boxes, standards, cabinets, and service equipment enclosures.

Replace item 4 in the list in the 1st paragraph of section 87-1.01D(2)(a) with:

10-19-18

4. Luminaires

Replace section 87-1.01D(2)(d) with:

10-19-18

87-1.01D(2)(d) Piezoelectric Axle Sensors

Piezoelectric axle sensors test consists of:

1. Demonstrating for each sensor:
 - 1.1. Capacitance is within 20 percent of the value shown on the sensor's data sheet
 - 1.2. Dissipation factor is less than 0.04 nF when measured in the 20 nF range
 - 1.3. Resistance is greater than 20 Megaohms
2. Collecting a minimum of 100 vehicle records for each lane and demonstrating:

- 2.1. Volume is within ± 3 percent accuracy
- 2.2. Vehicle classification is within 95 percent accuracy by type

Replace the 7th paragraph of section 87-1.03A with:

10-19-18

Notify the Engineer immediately if an existing facility is damaged by your activities:

1. Damaged existing traffic signal systems must be repaired or replaced within 24 hours. If the system cannot be fixed within 24 hours or it is located on a structure, provide a temporary system until the system can be fixed.
2. Damaged existing lighting systems must be repaired or replaced by nightfall. If the system cannot be fixed by nightfall, provide a temporary system until the system can be fixed.

Add to the end of section 87-1.03A:

10-19-18

Collect the geographic information system mapping data.

Replace the 12th paragraph of section 87-1.03B(1) with:

10-19-18

For Type 1, 2, and 5 conduits, use threaded bushings and bond them using a jumper. For other types of conduit, use nonmetallic bushings or end bell.

Replace the 3rd paragraph of section 87-1.03B(3)(a) with:

10-19-18

Place a minimum of 2 inches of sand bedding in a trench before installing the conduit and 18 inches of slurry cement over the conduit before placing additional backfill material.

The slurry must be pigmented to match AMS-STD-595.

Replace the 1st sentence in the 6th paragraph of section 87-1.03B(3)(c) with:

10-19-18

Backfill trench with slurry concrete under section 19-3.02E.

Replace the 9th paragraph of section 87-1.03B(3)(c) with:

10-19-18

Install innerducts as one continuous unit between vaults. Innerducts may be interrupted inside pull boxes located between vaults and cabinets.

Replace section 87-1.03D with:

10-19-18

87-1.03D Reserved

Replace section 87-1.03E(3) with:

10-19-18

87-1.03E(3) Concrete Pads, Foundations, and Pedestals

Construct foundations for standards, poles, metal pedestals, and posts under section 56-3.

Construct concrete pads, foundations, and pedestals for controller cabinets, telephone demarcation cabinets, and service equipment enclosures on firm ground.

Install anchor bolts using a template to provide proper spacing and alignment. Moisten the forms and ground before placing the concrete. Keep the forms in place until the concrete sets for at least 24 hours to prevent damage to the surface.

Use minor concrete for pads, foundations, and pedestals.

Construct a pad in front of a Type III service equipment enclosure. The pad must be 24 inches in length, 4 inches in thickness, and must match the width of the foundation.

In unpaved areas, place the top of the foundation 6 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. 2 inches above the grade for Type III service equipment enclosures

The pad must be 2 inches above the surrounding grade in unpaved areas.

In and adjacent to the sidewalk and other paved areas, place the top of the foundation 4 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. Level with the finished grade for Type G and Type A cabinets and Type III service equipment enclosures

The pad must be level with the finished grade in paved areas.

Apply an ordinary surface finish under section 51-1.03F.

Allow the foundation to cure for at least 7 days before installing any equipment.

Replace the 1st paragraph of section 87-1.03F(3)(c)(ii) with:

Install a Type 1 or 2 inductive loop conductor except use Type 2 for Type E and F loop detectors.

10-19-18

Delete the last paragraph of section 87-1.03G.

10-19-18

Replace the 4th paragraph of section 87-1.03H(2) with:

Use Method B as follows:

10-19-18

1. Cover the splice area completely with an electrical insulating coating and allow it to dry.
2. Apply 3 layers of half-lapped, PVC electrical tape.
3. Apply 2 layers of butyl-rubber, stretchable tape with liner.
4. Apply 3 layers of half-lapped, PVC, pressure-sensitive, adhesive tape.
5. Cover the entire splice with an electrical insulating coating and allow it to dry.

Replace section 87-1.03N with:

10-19-18

87-1.03N Fused Splice Connectors

Install a fuse splice connector with a fuse in each ungrounded conductor for luminaires, except for overhead sign luminaires. The connector must be located in the pull box adjacent to the luminaires.

If the pull box for the roadway luminaire is tamper resistant, install a fuse splice connector with 10 A fuse in the pull box and an additional fuse splice connector with a 5 A fuse in the handhole.

Install a fuse splice connector with a fuse on primary side of transformer.

Crimp the connector terminals onto the ungrounded conductors using a tool under the manufacturer's instructions. Insulate the terminals and make them watertight.

Add to the end of section 87-1.03T:

10-19-18

When replacing an existing accessible pedestrian signal, the housing color must match the color of the existing housing.

Add to the end of section 87-1.03U:

10-19-18

When replacing an existing push button assembly, the housing color must match the color of the existing housing.

Replace the 2nd paragraph of section 87-2.03A with:

10-19-18

Tighten the cap screws of the luminaire's clamping bracket to 10 ft-lb for roadway luminaires.

Replace section 87-3 with:

10-19-18

87-3 SIGN ILLUMINATION SYSTEMS

87-3.01 GENERAL

Section 87-3 includes specifications for constructing sign illumination systems.

Sign illumination system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Overhead sign luminaires
6. Service equipment enclosure
7. Photoelectric control

The components of a sign illumination system are shown on the project plans.

87-3.02 MATERIALS

Reserved

87-3.03 CONSTRUCTION

Perform the conductor test.

Install overhead sign luminaires under the manufacturer's instructions.

Do not modify the sign structure or mounting channels.

Perform the operational tests for the system.

87-3.04 PAYMENT

Not Used

Replace section 87-4.01D with:

10-19-18

87-4.01D Quality Assurance

Reserved

Replace section 87-4.02B with:

10-19-18

87-4.02B Battery Backup System

A battery backup system includes the cabinet, batteries, and the Department-furnished electronics assembly.

The electronics assembly includes the inverter/charger unit, power transfer relay, manually-operated bypass switch, battery harness, utility interconnect wires, battery temperature probe, and relay contact wires.

Replace the 2nd sentence in the 15th paragraph of section 87-4.02C with:

10-19-18

The background must comply with color no. 14109 of AMS-STD-595.

Replace section 87-4.03B with:

10-19-18

87-4.03B Battery Backup System Cabinets

Install the battery backup system cabinet to the right of the controller cabinet.

If installation on the right side is not possible, obtain authorization for installation on the left side.

Provide access for power conductors between the cabinets using:

1. 2-inch nylon-insulated, steel chase nipple
2. 2-inch steel sealing locknut
3. 2-inch nylon-insulated, steel bushing

Remove the jumper between the terminals labeled *BBS-1* and *BBS-2* in the 5 position terminal block in the controller cabinet before connecting the Department-furnished electronics assembly.

Replace section 87-7.02 with:

10-19-18

87-7.02 MATERIALS

Flashing beacon control assembly includes:

1. Enclosure.
2. Barrier-type terminal blocks rated for 25 A, 600 V(ac), made of molded phenolic or nylon material and have plated-brass screw terminals and integral marking strips.
3. Solid state flasher complying with section 8 of NEMA standards publication no. TS 1 for 10 A, dual circuits.

4. 15-A, circuit breaker per ungrounded conductor.
5. Single-hole-mounting toggle type, single-pole, single-throw switches rated at 12-A, 120 V(ac). Switches must be furnished with an indicating nameplate reading *Auto - Test*. A 15-A circuit breaker may be used in place of the toggle switch.

Replace 87-8 with:

10-19-18

87-8 PEDESTRIAN HYBRID BEACON SYSTEMS

87-8.01 GENERAL

87-8.01A Summary

Section 87-8 includes specifications for constructing pedestrian hybrid beacon system.

A pedestrian hybrid beacon system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors and cables
5. Standards
6. Pedestrian hybrid beacon face
7. Pedestrian signal heads
8. Service equipment enclosure
9. Department-furnished controller assembly
10. Accessible pedestrian signals
11. Push button assemblies
12. Luminaires
13. Fuse splice connectors
14. Battery backup system

The components of a pedestrian hybrid beacon system are shown on the project plans.

87-8.01B Definitions

Reserved

87-8.01C Submittals

Reserved

87-8.01D Quality Assurance

87-8.01D(1) General

Reserved

87-8.01D(2) Quality Control

Verify the sequence for the pedestrian hybrid beacon system per California Chapter 4F, Figure 3F-3 "Sequence for a Pedestrian Hybrid Beacon" during the operational test.

Test the battery backup system under section 87-1.01D(2)(c).

87-8.02 MATERIALS

87-8.02A General

The system must comply with California *MUTCD*, Chapter 4F.

The battery backup system must comply with section 87-4.02B.

87-8.02B Pedestrian Hybrid Beacon Face

A pedestrian hybrid beacon face consists of three 12-inch signal heads.

87-8.03 CONSTRUCTION

Install pedestrian hybrid beacon system under sections 87-4.03A and 87-4.03B.

87-8.04 PAYMENT

Not Used

Replace the 1st paragraph of section 87-12.03 with:

Install changeable message sign on sign structure under section 56-2.

10-19-18

Replace section 87-14.02 with:

10-19-18

87-14.02 MATERIALS

87-14.02A General

Vehicle speed feedback sign consists of a housing, display window, and radar unit.

Sign must:

1. Comply with the California MUTCD, Chapter 2B
2. Have an operating voltage of 120 V(ac) for permanent installations
3. Have a maximum weight of 45 lb
4. Have a wind load rating of 90 mph
5. Have an operating temperature range from -34 to 165 degrees F
6. Have a retroreflective white sheeting background

87-14.02B Housings

Housing must:

1. Be weatherproof (NEMA 3R or better) and vandal resistant
2. Be made of 0.09-inch-gauge welded aluminum with the outer surfaces being UV resistant
3. Have the manufacturer's name, model number, serial number, date of manufacture, rated voltage and rated current marked inside
4. Have the internal components easily accessible for field repair without removal of the sign

87-14.02C Display Windows

Display window consists of a cover, LED character display, and dimming control. Character display and cover must deflect together without damage to the internal electronics and speed detection components.

Cover must be:

1. Vandal resistant and shock absorbent
2. Field replaceable with the removal of external stainless-steel, tamper proof fasteners

Cover must be made of a minimum 0.25-inch-thick, shatter-resistant polycarbonate.

LED character display must:

1. Consist of two 7-segment, solid-state, numeric characters, which must:
 - 1.1. Be a minimum 15 inches in height
 - 1.2. Be visible and legible from a minimum distance of 1500 feet and legible from a minimum distance of 750 feet
 - 1.3. Consist of a minimum 16 LEDs, which must:
 - 1.3.1. Be amber and have a wavelength from 590 to 600 nm and rated for minimum 100,000 hours
 - 1.3.2. Must maintain a minimum 85 percent of the initial light output after 48 months of continuous use over the temperature range
2. Be capable of displaying the detected vehicle speed within 1 second

3. Remain blank when no vehicles are detected within the radar detection zone
4. Have the option to flash the pre-set speed limit when the detected vehicle speed is 5 miles higher than the pre-set speed
5. Be viewable only by the approaching traffic

Dimming control must:

1. Automatically adjust the character light intensity to provide optimum character visibility and legibility under all ambient lighting conditions
2. Have minimum 3 manual dimming modes of different intensities

87-14.02D Radar Units

Radar unit must:

1. Be able to detect up to 3 lanes of approaching traffic
2. Operate with an internal, low power, 24.159 GHz (K-band)
3. Be FCC approved Part 15 certified
4. Have a speed accuracy of ± 1 mph
5. Have a maximum 15 W power consumption

Replace 87-19 with:

10-19-18

87-19 FIBER OPTIC CABLE SYSTEMS

87-19.01 GENERAL

87-19.01A Summary

Section 87-19 includes specifications for constructing fiber optic cable systems.

A fiber optic cable system includes:

1. Conduit and accessories
2. Vaults
3. Warning tape
4. Fiber optic cables
5. Fiber optic splice enclosures
6. Fiber distribution units
7. Fiber optic markers
8. Fiber optic connectors and couplers

The components of a fiber optic system are shown on the project plans.

87-19.01B Definitions

Reserved

87-19.01C Submittals

At least 15 days before cable installation, submit:

1. Manufacturer's procedures for pulling fiber optic cable
2. Test reports from a laboratory accredited to International Standards Organization/International Electrotechnical Commission 17025 by the American Association for Laboratory Accreditation (A2LA) or the ANSI-ASQ National Accreditation Board (ANAB) for:
 - 2.1. Water penetration
 - 2.2. Cable temperature cycling
 - 2.3. Cable impact
 - 2.4. Cable tensile loading and fiber strain
 - 2.5. Cable compressive loading
 - 2.6. Compound flow
 - 2.7. Cyclic flexing
3. Proof of calibration for the test equipment including:

- 3.1. Name of calibration facility
- 3.2. Date of calibration
- 3.3. Type of equipment, model number and serial number
- 3.4. Calibration result

Submit optical time-domain reflectometer data files for each test in a Microsoft Excel format.

After performing the optical time-domain reflectometer test and the power meter and light source test, submit within 4 business days a hard copy and electronic format:

1. Cable Verification Worksheet
2. Segment Verification Worksheet
3. Link Loss Budget Worksheet

The worksheets are available at the Division of Construction website.

87-19.01D Quality Assurance

87-19.01D(1) General

Reserved

87-19.01D(2) Quality Control

Notify the Engineer 4 business days before performing field tests. Include exact location of the system or components to be tested. Do not proceed with the testing until authorized. Perform each test in the presence of the Engineer.

The optical time-domain reflectometer test consists of:

1. Inspecting the cable segment for physical damage.
2. Measuring the attenuation levels for wavelengths of 1310 and 1550 nm in both directions for each fiber using the optical time-domain reflectometer.
3. Comparing the test results with the data sheet provided with the shipment. If there are attenuation deviations greater than 5 percent, the test will be considered unsatisfactory and the cable segment will be rejected. The failure of any single fiber is a cause for rejection of the entire segment. Replace any rejected cable segments and repeat the test.

The power meter and light source test consists of:

1. Testing each fiber in a link using a light source at one end of the link and a power meter at the other end
2. Measuring and recording the power loss for wavelengths of 1310 and 1550 nm in both directions

Index matching gel is not allowed.

Installation and splicing of the fiber optic cable system must be performed by a certified fiber optic installer.

The optical time-domain reflectometer test and the power meter and light source test must be performed by a certified fiber optic technician.

The certification for the fiber optic installer and fiber optic technician must be from an organization recognized by the International Certification Accreditations Council and must be current throughout the duration of the project.

87-19.02 MATERIALS

87-19.02A General

All metal components of the fiber optic cable system must be corrosion resistant.

All connectors must be factory-installed and tested.

Patch cords, pigtails, and connectors must comply with ANSI/TIA-568.

Pigtails must have a minimum 80 N pull out strength.

A splice cassette may be used in place of a pigtail and a splice tray.

Each cable reel must have a weatherproof label or tag with information specified in ANSI/ICEA S-87-640 including:

1. Contractor's name
2. Contract number
3. Number of fibers
4. Cable attenuation loss per fiber at 1310 and 1550 nm

The labeled or tagged information must also be in a shipping record in a weatherproof envelope. The envelope must be removed only by the Engineer.

87-19.02B Vaults

A vault must:

1. Comply with section 86-1.02C and AASHTO HS 20-44, and load tested under AASHTO M 306.
2. Be a minimum:
 - 2.1. 4 feet wide by 4 feet high by 4 feet long nominal inside dimensions for box type.
 - 2.2. 4 feet high by 4 feet outside diameter for round type.
3. Have a minimum access of:
 - 3.1. 30 inches diameter for round type.
 - 3.2. 3 feet wide by 3 feet long for box type.
4. Be precast either modular or monolithic.
5. Have cable racks installed on the interior sides. A rack must:
 - 5.1. Be fabricated from ASTM A36 steel plate.
 - 5.2. Support a minimum of 100 pounds per rack arm.
 - 5.3. Support a minimum of 4 splice enclosures and a minimum of 4 cables with a minimum slack of 50 feet each.
 - 5.4. Be hot-dip galvanized after manufacturing.
 - 5.5. Be bonded and grounded.
6. Have a minimum:
 - 6.1. Two 4-inch diameter knockouts on each side for box type.
 - 6.2. Two 4-inch diameter knockouts placed every 90 degrees for round type.
7. Have a minimum 2-inch-diameter drain hole at the center of base.

Entry points for knockouts must not cause the cable to exceed its maximum bend radius.

The access cover must:

1. Be a two-piece torsion-assisted sections or a minimum 30-inch-diameter cast iron.
2. Have inset lifting pull slots.
3. Have markings *CALTRANS* and *FIBER OPTIC*.

87-19.02C Fiber Optic Cable

The fiber optic cable must:

1. Comply with 7 CFR parts 1755.900, 1755.901, and 1755.902, and ANSI/ICEA S-87-640
2. Be a singlemode, zero-dispersion, and have non-gel loose type buffer tubes
3. Have no splices
4. Have a Type H or Type M outer jacket
5. Be shipped on a reel
6. Have 10 feet of length on each end of the cable accessible for testing

87-19.02D Fiber Optic Splice Enclosures

A fiber optic splice enclosure must:

1. Not exceed 36 inches in length, 8 inches in width, and 8 inches in height
2. Be made of thermoplastic material, weather proof, chemical and UV resistant, and re-sealable
3. Accommodate a minimum of 8 internal splice trays
4. Have from 1/4 to 1 inch in diameter cable entry ports

5. Have brackets, clips and cable ties
6. Have means to anchor the dielectric member of the fiber optic cable
7. Include grounding hardware

87-19.02E Fiber Distribution Units

The fiber distribution unit consists of a housing, a patch panel, a 12-multicolor pigtail, and a splice tray.

The fiber distribution unit must be self-contained and pre-assembled.

The housing must:

1. Be a 19-inch rack-mountable modular-metal enclosure
2. Be a one rack unit
3. Have cable clamps to secure buffer tube to the chassis
4. Have cable accesses with rubber grommets or similar material to prevent the cable from coming in contact with the bare metal
5. Be weatherproof
6. Have a hinged top door with a latch or thumbscrew to hold it in the closed position

A patch panel must have a minimum of 12-singlefiber type connector sleeves.

A pigtail must:

1. Be a simplex single mode fiber in a 900 μ m tight buffer with a 12-inch-outer-diameter PVC jacket
2. Have a fiber optic connector attached on one end and bare fiber on the other end
3. Be at least 3 feet in length
4. Have the manufacturer's part number on the jacket

Pigtails must be single-fiber or ribbon type.

87-19.02F Patch Cords

Patch cords must:

1. Be a singlemode fiber in a 900 μ m tight buffer with a 0.12-inch-outer-diameter PVC jacket
2. Have fiber optic connectors attached on both ends
3. Be at least 6 feet in length
4. Have manufacturer's part number on the jacket

Duplex patch cords must be of round cable structure, and not have zip-cord structure.

87-19.02G Splice Trays

Splice trays must:

1. Have brackets to spool incoming fibers a minimum of 2 turns.
2. Have means to secure and protect incoming buffer tubes, pigtails, and a minimum of 12 heat shrink fusion splices.
3. Be stackable.
4. Have a snap-on or hinged cover. The cover may be transparent.

87-19.02H Fiber Optic Markers

Fiber optic markers must be:

1. Type K-2 (CA) object markers for vaults or pull boxes.
2. Disk markers for paved areas and transition points from unpaved to paved areas. The disk marker must be metallic, lead free and 4 inches in diameter, and must have a mounting stem at the center of the disk. The mounting stem must be a minimum 3 inches long and a minimum 0.70 inch in diameter.
3. Non-reflective Class 1, Type F, flexible post delineators for unpaved areas.

87-19.02I Fiber Optic Connectors and Couplers

Connectors must be:

1. 0.1-inch ceramic ferrule pre-radiused type
2. Capped when not used

Couplers must be made of the same material as the connector's housing and have ceramic sleeves.

Singlemode fiber optic connectors must have a yellow strain relief boot or a yellow base.

87-19.03 CONSTRUCTION

87-19.03A General

Perform the optical time-domain reflectometer test:

1. On the fiber optic cable upon its arrival to the job site and before its installation. Complete the Cable Verification Worksheet. Do not install the fiber optic cable until the Engineer's written approval is received.
2. After the fiber optic cable segments have been pulled, but before breakout and termination. Complete the Segment Verification Worksheet.
3. Once the passive cabling system has been installed and is ready for activation. If the measured individual fusion splice losses exceed -0.30 dB, re-splice and retest. At the conclusion of the optical time-domain reflectometer test, perform the power meter and light source test. If the measured link loss exceeds the calculated link loss, replace the unsatisfactory cable segments or splices and retest. Complete the Link Loss Budget Worksheet.

87-19.03B Vaults Installation

Install a vault as shown and with the side facing the roadway a minimum of 2 feet from the edge of pavement or back of dike, away from traffic.

Install the top of the vault flush with surrounding grade in paved areas and 2 inches above the surrounding grade in unpaved areas.

Place 6 inches of minor concrete around vaults. In unpaved areas, finish top of concrete at a 2 percent slope away from cover. In paved areas, finish top of concrete to match existing slope.

Bolt the steel cover to the vault when not working in it.

87-19.03C Fiber Optic Cable Installation

Install fiber optic cable by a certified installer or a representative from the fiber optic cable manufacturer during installation.

When using mechanical aids to install fiber optic cable:

1. Maintain a cable bend radius at least twenty times the outside diameter of the cable
2. Use cable grips having a ball bearing swivel
3. Use a pulling force on a cable not to exceed 500 pound-foot or manufacturer's recommended pulling tension, whichever is less

When installing the cable using the air blown method, the cable must withstand a static air pressure of 110 psi.

Lubricate the cable using a lubricant recommended by the cable manufacturer.

Install fiber optic cable without splices except where shown.

Provide a minimum of 65 feet of slack for each fiber optic cable at each vault. Divide the slack equally on each side of the splice enclosure.

Install tracer wires in the fiber optic conduits and innerducts as shown. Provide a minimum 5 feet of slack tracer wire in each pull box and vault from each direction. You may splice tracer wire at intervals of not less than 500 feet and only inside vaults or pull boxes.

If a fiber optic cable and tracer wire is installed in an innerduct, pulling a separate fiber optic cable into a spare duct to replace damaged fiber will not be allowed.

Apply a non-hygroscopic filling compound to fiber optic cable openings.

Seal the ends of conduit and innerducts after cables are installed.

Install strain relief for fiber optic cable entering a fiber optic enclosure.

Identify fibers and cables by direct labeling, metal tags, or bands fastened in such a way that they will not move. Use mechanical methods for labeling.

Provide identification on each fiber optic cable or each group of fiber optic cables in each vault and at the end of terminated fibers. Fiber optic cable must be identified as shown in the following table:

Cable Identification^a			
Sequence order	Description	Code	Numbers of characters
1	Fiber type	S: Singlemode	1
2	Fiber count	###: Example 048	3
3	Begin point	T: TMC H: Hub V: Video Node D: Data Node C: Cable Node TV: Camera CM: CMS E: Traffic Signal RM: Ramp Meter TM: Traffic Monitoring/ Count Station/Vehicle Count Station (VDS, TMS) HA: Highway Advisory Radio EM: Extinguishable Message Sign RW: Roadway Weather Information System WM: Weigh In Motion WS: Weigh-Station Bypass System SV: Vault SC: Splice Cabinet	1 or 2
4	Begin point county abbreviation	AA or AAA: Examples: Orange (ORA), San Mateo (SM)	2 or 3
5	Begin point route number	###: Examples: 005, 082, 114	3
6	Begin point post mile	#####: 02470 (example 024.70): Actual PM value to the 1/100 value	5
7	End Point	In the same way as for Begin Point	1 or 2
8	End point county abbreviation	In the same way as for Begin Point County Abbreviation	2 or 3
9	End point route number	In the same way as Begin Point Route Number	3
10	End point post mile	In the same way as Begin Point Post Mile	5

^aCable identification example: The cable code S 048 SV SM 084 02470 SV SC 082 02510 describes a singlemode, 48 strand, cable starting at a fiber optic vault in San Mateo County on Route 84 at post mile 24.70, and ending at another fiber optic vault in Santa Clara County on Route 82 at post mile 25.10.

Place labels on the cables at the following points:

1. Fiber optic vault and pull box entrances and exits
2. Splice enclosures entrance and exit

3. Fiber distribution unit entrance

Lace fiber optic cable inside controller cabinets and secure to the cage.

Support the fiber optic cable within 6 inches from a termination and every 2 feet.

Secure fiber optic cables to the cable racks. Store excess cable in a figure 8 fashion.

87-19.03D Fiber Optic Cable Splices

Use fusion splicing for fiber optic cables.

Splice single-buffer tube cable to multi-buffer tube cable using the mid-span access method under manufacturer's instructions. Any mid-span access splice or fiber distribution unit termination must involve only those fibers being spliced as shown.

Place fiber splices in the splice enclosures installed in the vaults.

87-19.03E Splice Enclosures Installation

Maintain an equal amount of slack on each side of the splice enclosure.

Secure the fiber optic splices in splice tray.

Secure the splice trays to the inner enclosure.

Label cables and buffer tubes.

Do not seal fiber splice enclosure until authorized and the power meter and light source test is performed. Seal the enclosure under manufacturer's instructions.

Flash test the outer enclosure under manufacturer's instructions in the presence of the Engineer. Visually inspect the enclosure. If bubbles are present, identify the locations where the bubbles are present, take corrective actions and repeat the flash test until no bubbles are present.

Attach the splice enclosure to the side wall of a vault or hub with a minimum 2 feet distance between the ground and the bottom of the enclosure.

Secure fiber optic cables to the chassis using cable clamps for fiber optic units.

Connect a minimum of one bonding conductor to a grounding electrode after mounting the fiber optic enclosure to the wall. If there are multiple bonding conductors, organize the conductors in a neat way.

87-19.03F Fiber Optic Distribution Unit Installation

Spool incoming buffer tubes 2 feet in the splice tray and expose 1 foot of individual fibers.

Maintain a minimum 2-inch-bend radius during and after installation in the splice tray.

Splice incoming fibers in the splice tray.

Restrain each fiber in the splice tray. Do not apply stress on the fiber when located in its final position.

Secure buffer tubes near the entrance of the splice tray.

Secure splice trays under manufacturer's instructions.

Label splice tray after splicing is completed.

Install patch cords in fiber distribution units and patch panels. Permanently label each cord and each connector in the panel with the system as shown.

87-19.03G Fiber Optic Markers Installation

Install fiber optic markers at 12-inch offset on the side furthest away from the edge of travel way:

1. For fiber optic cable at 500 feet apart in areas where the distance between vaults or pull boxes is greater than 500 feet
2. Adjacent to vaults and pull boxes

3. For fiber optic cable turns at:
 - 3.1. Beginning of the turn
 - 3.2. Middle of the arc
 - 3.3. End of the turn

When a fiber optic cable crosses a roadway or ramp, install a disk marker over the conduit trench on:

1. Every shoulder within 6 inches from the edge of pavement
2. Delineated median
3. Each side of a barrier

Install markers under section 81 except each retroreflective face must be parallel to the road centerline and facing away from traffic.

87-19.04 PAYMENT

Not Used

Replace 87-20 with:

10-19-18

87-20 TEMPORARY ELECTRICAL SYSTEMS

87-20.01 GENERAL

Section 87-20 includes specifications for providing temporary electrical systems.

Obtain the Department's authorization for the type of temporary electrical system and its installation method.

A temporary system must operate on a continuous, 24-hour basis.

A temporary electrical system must have a primary power source and a back-up power source from the following power sources:

1. Commercial power from a utility company
2. Generator system
3. Photovoltaic system

87-20.02 MATERIALS

87-20.02A General

Material and equipment may be new or used.

Temporary wood poles must comply with section 48-6.

The components of a temporary system are shown on the project plans.

If you use Type UF-B cable, the minimum conductor size must be no. 12.

87-20.02B Temporary Flashing Beacon Systems

A temporary flashing beacon system consists of a flashing beacon system, wood post, and a power source.

The system must comply with the specifications for a flashing beacon system in section 87-7, except it may be mounted on a wood post or a trailer.

87-20.02C Temporary Lighting Systems

A temporary lighting system consists of a lighting system, a power source, and wood poles.

The system must comply with the specifications for a lighting system in section 87-2, except it may be mounted on a wood pole or a trailer.

87-20.02D Temporary Signal Systems

A temporary signal system consists of a signal and lighting system, wood poles and posts, and a power source.

System must comply with the specifications for a signal and lighting system in section 87-4, except:

1. Signal heads may be mounted on a wood pole, mast arm, tether wire, or a trailer
2. Flashing beacons may be mounted on a wood post, or a trailer

87-20.02E Generators

A generator must:

1. Be 120 V(ac) or 120/240 V(ac), 60 Hz, 2.5 kW minimum, continuous-duty type
2. Be powered by a gasoline, LPG, or diesel engine operating at approximately 1,800 rpm with an automatic oil feed
3. Be equipped to provide automatic start-stop operation with a 12 V starting system
4. Have generator output circuits that have overcurrent protection with a maximum setting of 15 A
5. Have enough fuel storage to operate when it is unattended
6. Have a spark arrester complying with Pub Cont Code § 4442

A back-up power source must:

1. Have an automatic transfer switch
2. Start automatically and transfer the system load upon reaching the operating voltage, in the event of a power source failure

87-20.02F Automatic Transfer Switches

An automatic transfer switch must provide:

1. Line voltage monitoring in the event of a power outage that signals the back-up power source to start
2. Start delay, adjustable from 0 to 6 seconds, to prevent starting if the power outage is only momentary and a stop delay, adjustable from 0 to 8 minutes, to allow the back-up power source to unload.
3. Transfer delay from 0 to 120 seconds to allow the back-up power source to stabilize before connecting to the load and retransfer delay from 0 to 32 minutes to allow the line voltage to stabilize.
4. Mechanical interlock to prevent an application of power to the load from both sources and to prevent backfeeding from the back-up power source to the primary power source.

87-20.03 CONSTRUCTION

87-20.03A General

Provide electrical and telecommunication services for temporary systems. Do not use existing services unless authorized.

Provide power for the temporary electrical systems.

Commercial power must be 120 V(ac) or 120/240 V(ac) single phase. Make arrangements with the utility company for providing service. Protect the power source in a locked enclosure. Provide keys to all locks to the Engineer.

Install conductors and cables in a conduit, suspended from wood poles at least 25 feet above the roadway, or use direct burial conductors and cables.

You may saw slots across paved areas for burial conductors and cables.

Install conduit outside the paved area at a minimum of 12 inches below grade for Type 1 and 2 conduit and at a minimum of 18 inches below grade for Type 3 conduit.

Install direct burial conductors and cables outside the paved area at a minimum depth of 24 inches below grade.

Place the portions of the conductors installed on the face of wood poles in either Type 1, 2, or 3 conduit between the point 10 feet above grade at the pole and the pull box. The conduit between the pole and the pull box must be buried at a depth of at least 18 inches below grade.

Place conductors across structures in a Type 1, 2, or 3 conduit. Attach the conduit to the outside face of the railing.

Mount the photoelectric unit at the top of the standard or wood post.

You may abandon in place conductors and cables in sawed slots or in conduit installed below the ground surface.

87-20.03B Temporary Flashing Beacon Systems

Protect each flashing beacon with a fused splice connector on the line side. Wherever conductors are run overhead, install the splice connector in the line side outside of the control assembly.

87-20.03C Temporary Lighting Systems

Protect each luminaire with a fused splice connector on the line side. Wherever conductors are run overhead, install the fuse splice connectors in the line side before entering the mast arm.

87-20.03D Temporary Signal Systems

You may splice conductors that run to a terminal compartment or a signal head on a pole to the through conductors of the same phase in a pull box adjacent to the pole. Do not splice conductors or cables except in a pull box or in a NEMA 3R enclosure.

The Department provides the timing for the temporary signal.

Maintain the temporary signal except for the Department-furnished controller assembly.

87-20.04 PAYMENT

Not Used

Replace item 7 in the list in the 2nd paragraph of section 87-21.03B(2) with:

7. Camera system

10-19-18

AA

DIVISION XI MATERIALS

90 CONCRETE

10-19-18

10-19-18

Delete the 2nd paragraph of section 90-3.02A.

AA

96 GEOSYNTHETICS

10-19-18

Replace the 3rd table in the 3rd paragraph of section 96-1.02R with:

10-19-18

Cushion Fabric

Quality characteristic	Test method	Requirement					
		Class 10	Class 12	Class 16	Class 24	Class 32	Class 60
Mass per unit area (oz/sq yd)	ASTM D5261	10	12	16	24	32	60
Grab tensile break strength (min, lb)	ASTM D4632	230	300	370	450	500	630
Grab tensile break elongation (min, %)	ASTM D4632	50					
Puncture strength (min, lb)	ASTM D6241	700	800	900	1100	1700	2400
Trapezoidal tear strength (min, lb)	ASTM D4533	95	115	145	200	215	290
UV resistance (min, %)	ASTM D7238	70					